PILOT'S HANDBOOK FOR SIDEWINDER 1C (AIM-9C AND AIM-9D) AIR-TO-AIR GUIDED MISSILES

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PUBLISHED BY DIRECTION OF
THE CHIEF OF THE BUREAU OF NAVAL WEAPONS

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FOREWORD

NAVWEPS OP 3353 provides information for the pilot who will be flying aircraft armed with the Sidewinder 1C guided missiles, AIM-9C and AIM-9D. This improved version of the Sidewinder differs in many respects from the earlier Sidewinder 1 and 1A missiles. However, the basic design concepts of simplicity, reliability, and ease of handling have been retained. A more detailed description, the operation, and the handling of these missiles are given in NAVWEPS OP 3351 and OP 3352.

CONTENTS

ILLUSTRATIONS

SAFETY SUMMARY

The following CAUTIONS are repeated from the text because if not strictly followed the effectiveness of the missile may be destroyed:

CAUTIONS

The AIM-9C missile envelopes are aerodynamic envelopes only. They do NOT represent seeker performance limits, which are a function of the AI radar capabilities and configuration of the specific target under attack, not merely its altitude and speed. (Page 3-1)

The AIM-9D missile envelopes are aerodynamic envelopes only. They do NOT represent seeker performance which is a function of target characteristics, target aspect, altitude, background, and range. (Page 3-1)

AIM-9C and AIM-9D Missiles Mounted on Aircraft.

Chapter 1

GENERAL DESCRIPTION

1-1 INTRODUCTION

The Sidewinder 1C (AIM-9C and AIM-9D) air-to-air missile (frontispiece) system is an even more effective and versatile weapon system than its earlier versions, the Sidewinder 1 and Sidewinder 1A.

This handbook is provided to acquaint the pilot with this missile system—how it operates, how to aim and fire it, its advantages and limitations, and how it differs from the earlier versions.

1-2 DESCRIPTION

The Sidewinder 1C missile system is the result of further development of the original Sidewinder principles to provide a missile that makes possible nose-on or tail-on attacks against targets flying at speeds of over Mach 2 and at altitudes up to 80,000 feet.

Although the Sidewinder 1C is a tremendous improvement over its predecessors, the simplicity of design of the original Sidewinder has been retained. It still consists basically of four sections, figure 1-1, easily assembled by means of clamp-ring joints, with over-all dimensions only slightly changed from those of the Sidewinder 1 and 1A, figure 1-2.

The Sidewinder 1C missile can be assembled in either of two configurations: the infrared (AIM-9D) or the radar (AIM-9C) version, figure 1-3.

1-2.1 GUIDANCE AND CONTROL SECTIONS. Two mechanically interchangeable guidance and control sections are provided for the Sidewinder 1C missile system: the infrared Guidance and Control Group Mk 18, based on a long-wavelength infrared-homing seeker; and the semiactive radar Guidance and Control Group Mk 12, based on a radar seeker. Each

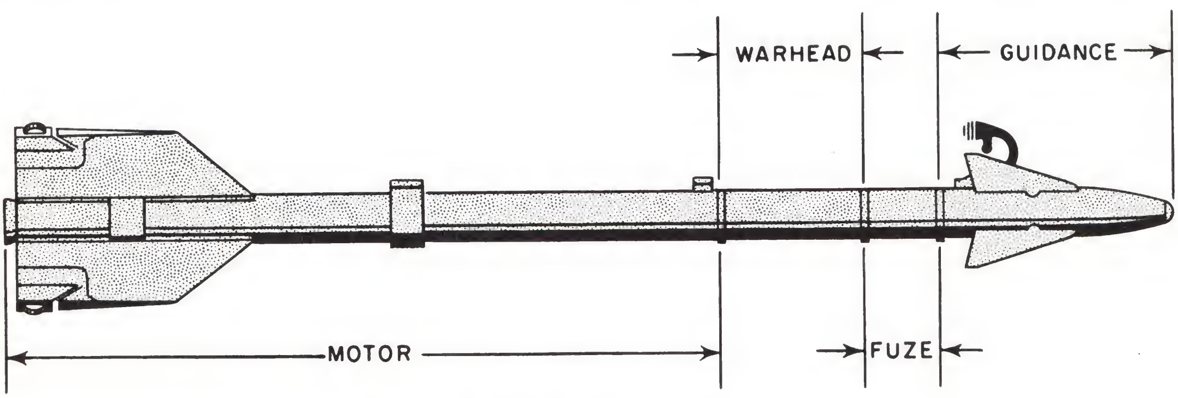
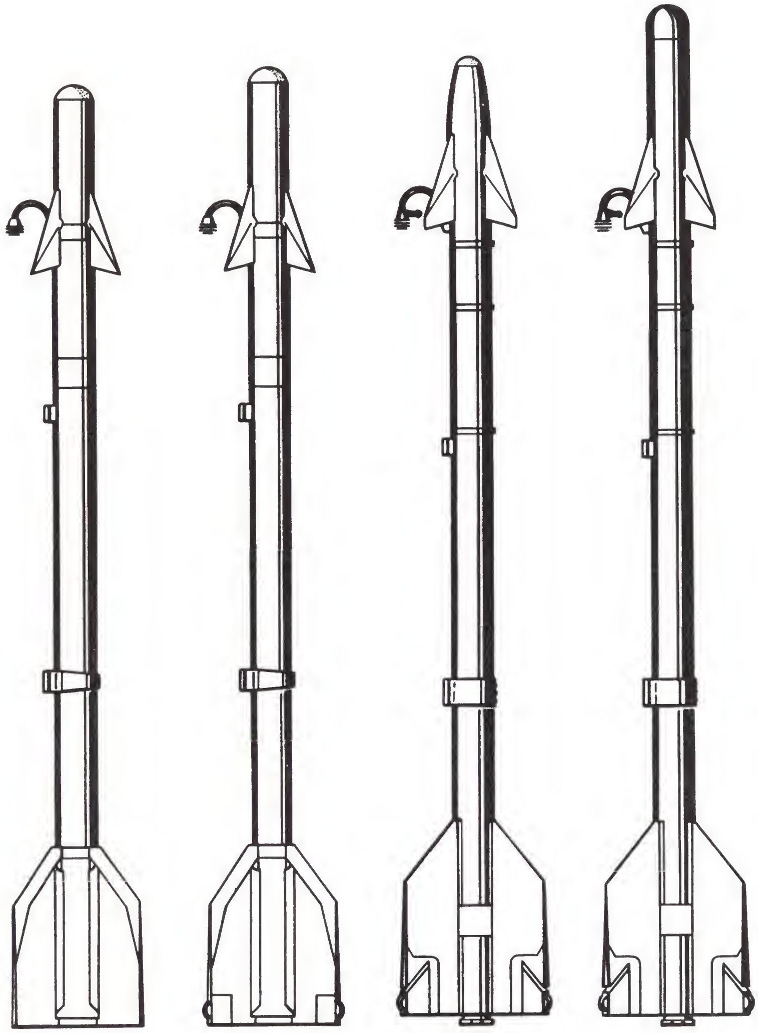


Figure 1-1. Sections of the Sidewinder 1C Missile.



	I	IA	IC AIM-9D	IC AIM-9C
LENGTH, IN.	110	112	113	119
WEIGHT, LB.	155	160	195	210

Figure 1-2. The Sidewinder Family.

guidance-control group (GCG) uses the same type of torque-balance control servo—the Mk 18 with 60 seconds of guidance life, the Mk 12 with 38 seconds. The interchangeable GCGs are shown in figure 1-4.

1-2.1.1 Infrared Guidance and Control Group Mk 18. The infrared Sidewinder 1C (AIM-9D) guidance principle is the same as that of the original Sidewinder. The servo control system is also the same. The heart of the missile is the infrared Guidance and Control Group Mk 18.

Several important refinements have been made in the seeker design, however. The first is the streamlining of the nose, figure 1-5. This ogive configuration gives a missile drag smaller than that of the Sidewinder 1A,

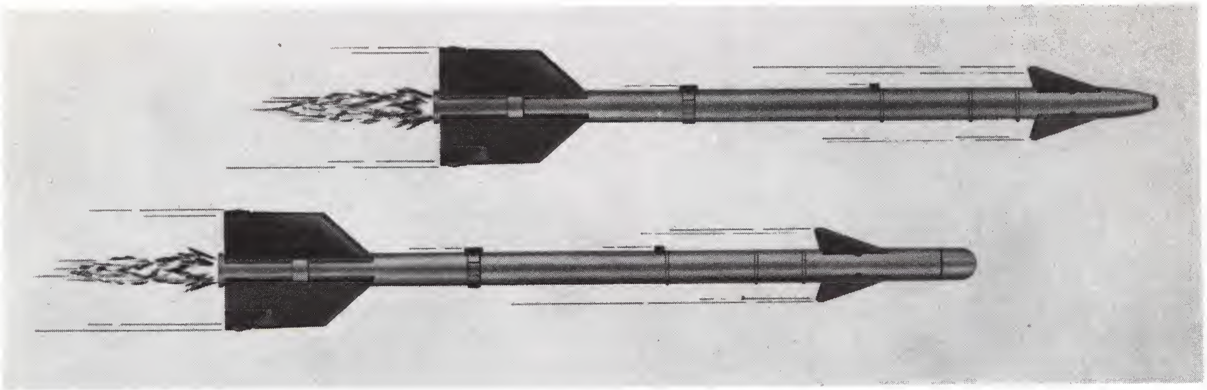


Figure 1-3. Two Configurations of Sidewinder 1C Missile.

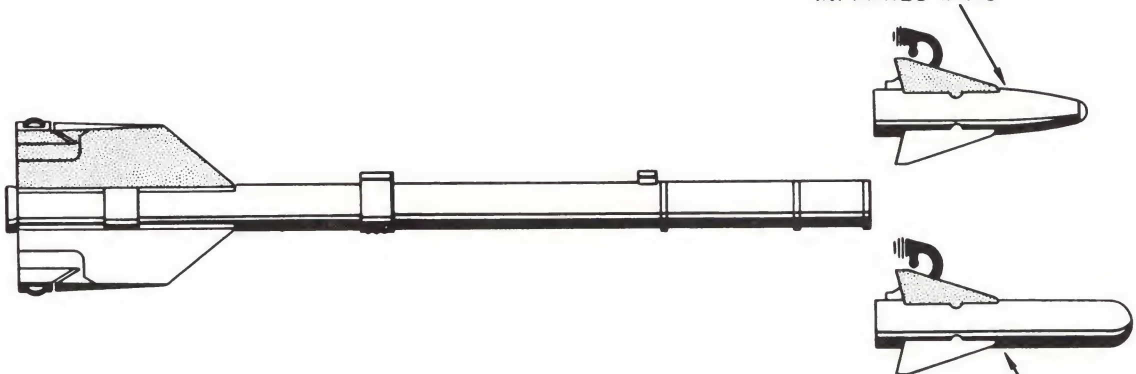


Figure 1-4. Interchangeable Guidance and Control Groups.

thus greatly increasing the missile range at low altitude. A new magnesium fluoride dome material withstands extreme thermal environment and prevents infrared saturation from decoying the missile. This material is translucent, and the dome is no longer transparent as was the case with earlier versions.

A new photodetector cell accepts long-wavelength radiation, sees a minimum of background reflections, and receives much more of the target radiation despite engine cooling devices and shielding. This high sensitivity has been attained by using high-pressure nitrogen or air to cool the detector to liquid nitrogen temperatures. A gas bottle (coolant tank) in the missile launcher supplies sufficient air or nitrogen through the electrical umbilical cord to ensure high seeker sensitivity throughout the flight time of the carrying aircraft. Finally, the gyro gimbal angle limit has been increased from 25 to 40 degrees, making it possible to launch attacks from much larger angles off the tail.

1-2.1.2 Radar Guidance and Control Group Mk 12. The radar version (AIM-9C) retains the original Sidewinder principle of operation—a few components performing many functions. The servo control method of operation again remains unchanged. The heart of this missile is the radar Guidance and Control Group Mk 12.

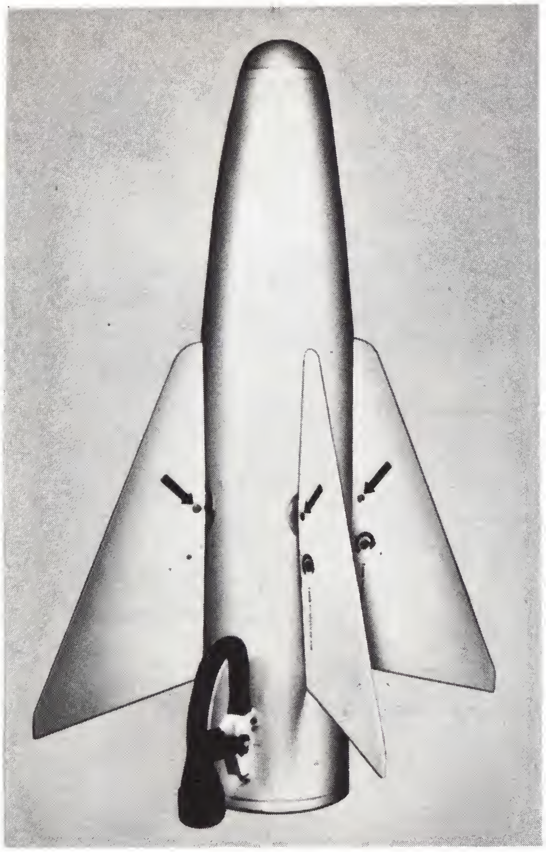


Figure 1-5. Infrared Guidance and Control Group Mk 18.

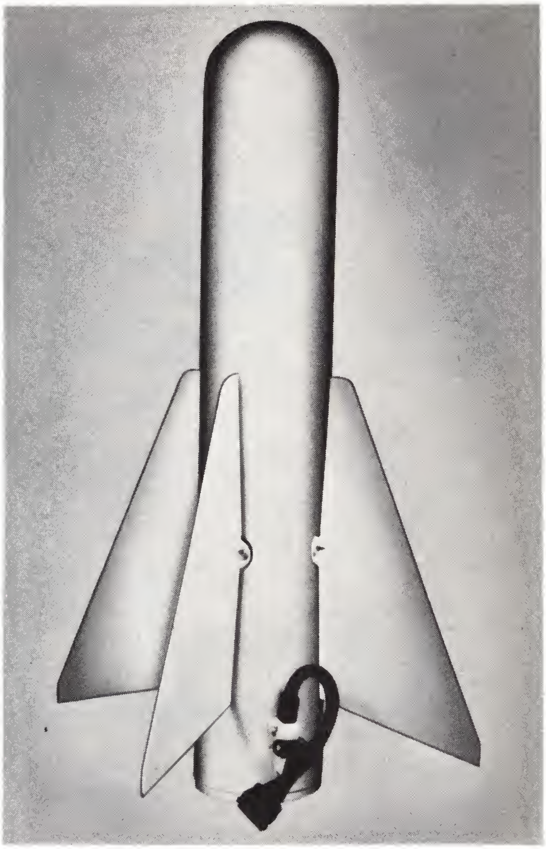


Figure 1-6. Radar Guidance and Control Group Mk 12.

The radar seeker head consists of the radome, antenna, gyro-precession assembly, and electronic circuits, figure 1-6.

The hemispherical radome is made of a thermally and mechanically shock-resistant ceramic material, able to withstand high in-flight temperatures and rain erosion.

Guidance is of the semiactive and passive radar type, and the missile must be used on aircraft with X-band airborne interceptor (AI) radar capable of both search and track modes.

In the semiactive mode, the missile homes on the pulsed radar energy emitted by the launching aircraft and reflected off the target into the radar seeker. In the passive mode, which is activated automatically, the missile homes directly on the jamming energy being radiated by the target aircraft.

1-2.2 CONTROL. Actual flight control of both versions of the Sidewinder 1C is provided by a set of canard fins, controlled by a pneumatic actuator or servo that is located in the after part of each GCG, figure 1-7. These servo-controlled fins provide a lift force on the airframe proportional to the input signal from the respective seekers.

A solid-propellant gas-generating grain, which discharges gas through

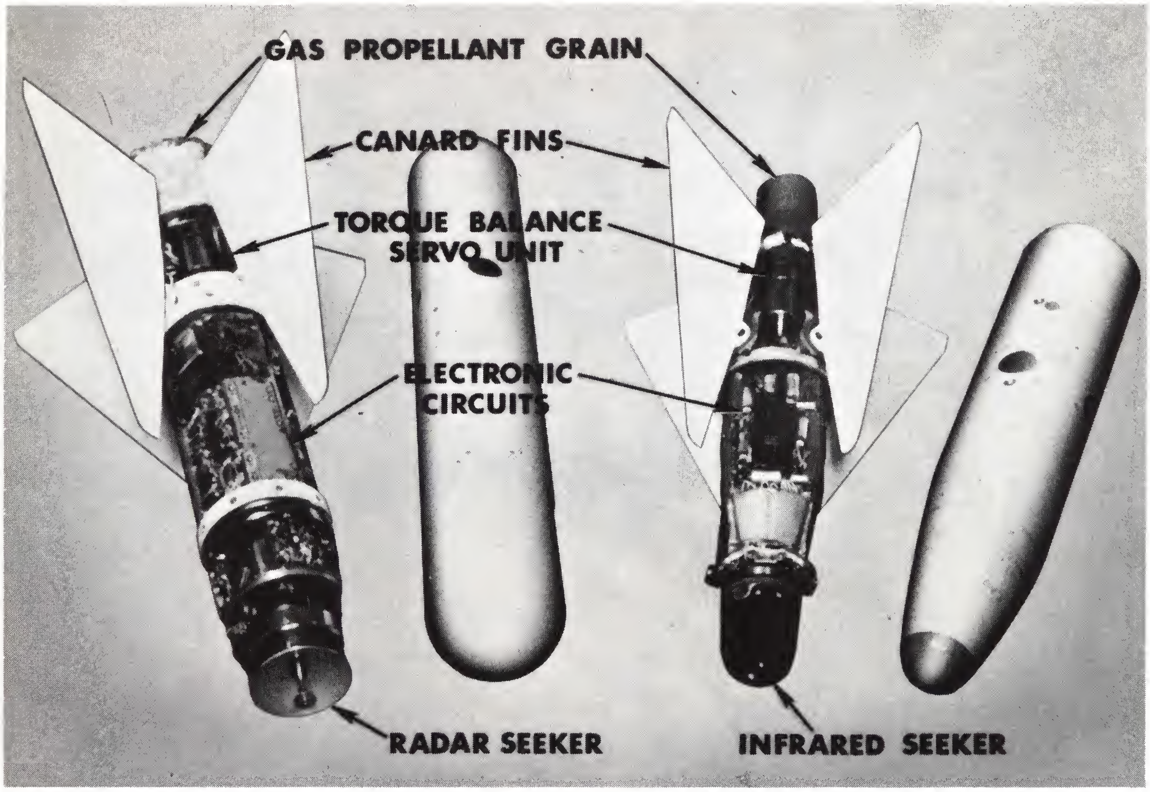


Figure 1-7. Control Units of Two Sidewinder 1C Configurations.

a torque-balance servo, supplies the power for operating the guidance fins. This same source also provides the electrical power for the entire missile during missile flight.

1-2.3 FUZES. Two mechanically interchangeable influence fuzes are available for either version of the Sidewinder 1C missile: infrared (IR) and radio frequency (RF). The fuze, which consists of a target-detecting device (TDD) and a safety-arming device (S-A), is located between the GCG and the warhead. The Mk 323 (IR) fuze contains the Mk 24 TDD and the Mk 13 S-A; the Mk 322 (RF) fuze contains the Mk 15 TDD and the Mk 13 S-A, figure 1-8.

Although either fuze can be used with either version of the missile, the IR fuze is normally used with the infrared missile (AIM-9D) and the RF fuze with the radar missile (AIM-9C).

Details of operation of both fuzes are Secret, but the principle of both is to detonate the warhead when the missile passes within a prescribed distance of the target. A contact hit is not necessary, therefore, to get a kill.

Both fuzes perform the additional function of preventing warhead detonation during the first 600 to 1000 feet of missile flight to protect the firing aircraft. This feature, therefore, prevents effective use of the missile when firing at a range less than 1000 feet.

If the missile passes out of range of the target, a self-destruct feature in the GCG detonates the warhead after burnout of the gas-generator grain.

1-2.4 WARHEAD. The warhead, figure 1-9, is a new continuous-rod type, insensitive to high temperatures, and

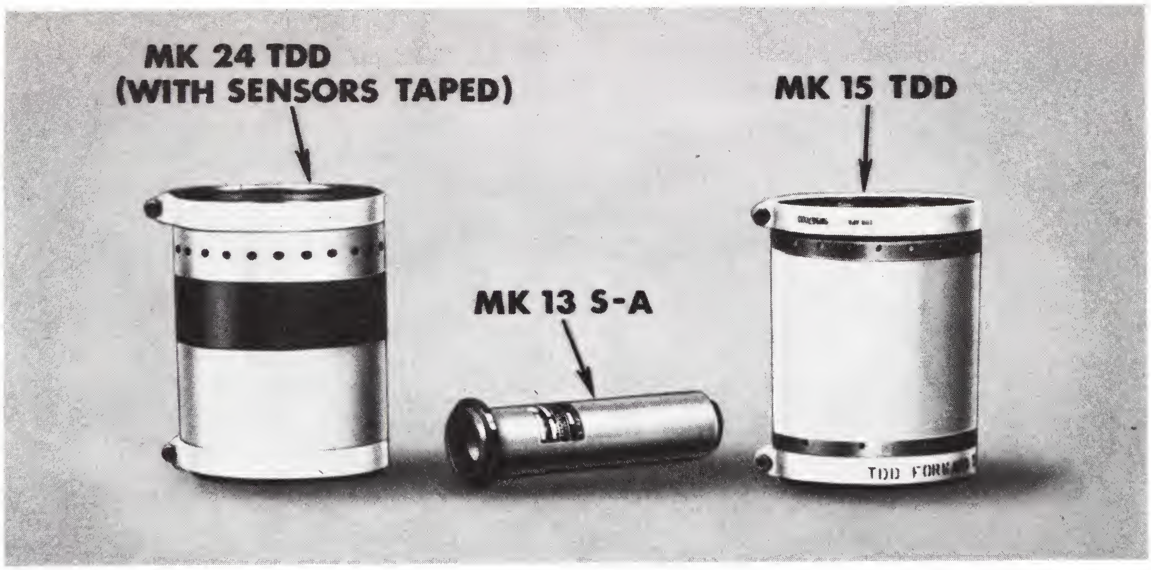


Figure 1-8. Interchangeable Fuzes.

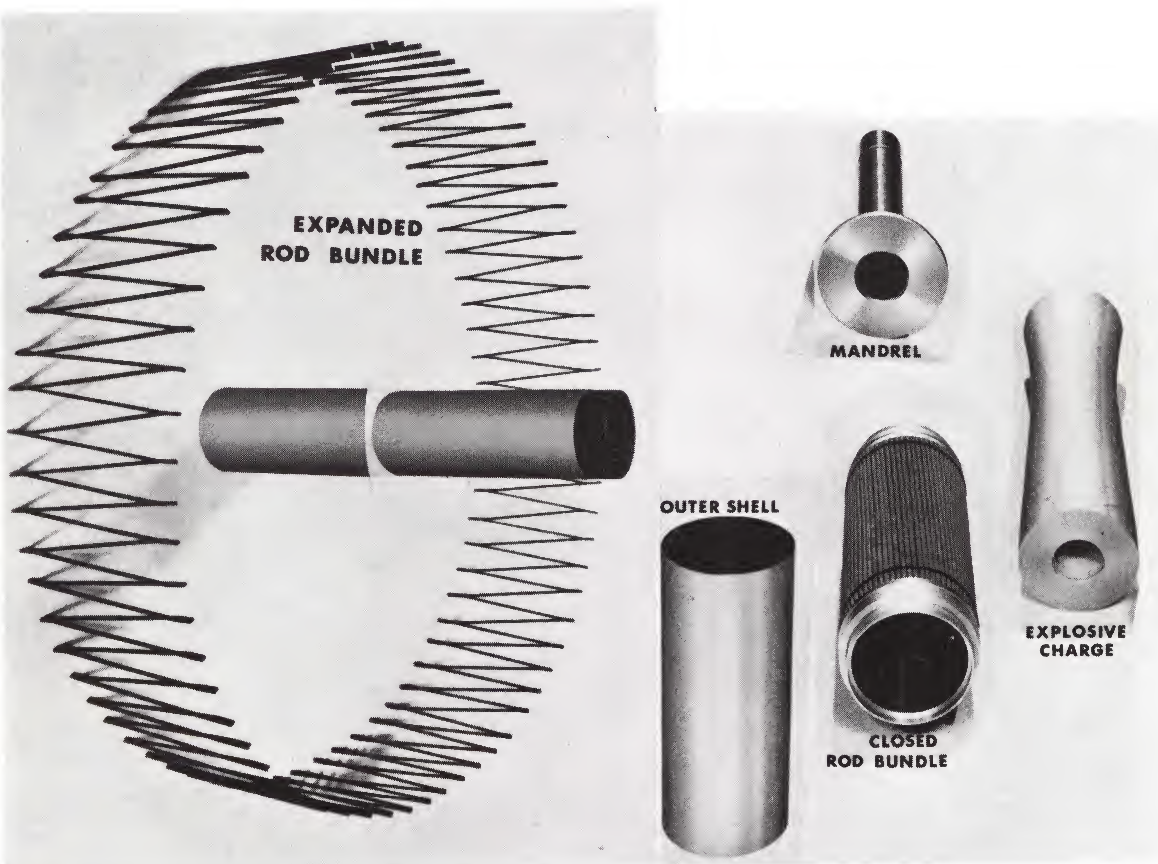


Figure 1-9. Warhead Mk 48.

exceptionally destructive at all altitudes, figure 1-10.

Upon detonation, the warhead expands at 4000 ft/sec, as a continuous ring, to a maximum diameter of 34 feet. This steel ring can knife through the skin and skeletal members of the toughest aircraft structures.

The effectiveness of this warhead does not diminish with an increase in altitude, as does the blast-dependent fragmentation warhead of the Sidewinder 1A.

1-2.5 MOTOR. A new single-stage, high-performance, solid-propellant motor (MK 36), figure 1-11, boosts the Sidewinder 1C missile to a maximum speed of Mach 2.5 over that of the firing aircraft. The motor gives an average of 3500 pounds of thrust during the 5 seconds of burning time.

Attached to the after end of the motor are the wings. Rollerons attached to the wing tips provide pitch, yaw, and roll stabilization during missile flight. These rollerons are driven by the airstream and act as gyros to counteract any tendency of the missile to pitch, yaw, or roll.

1-2.6 AIRCRAFT CARRYING AND LAUNCHING ACCESSORIES. The missile is carried and launched from aircraft by means of the LAU-7/A launcher, figure 1-12. The missile is

Figure 1-10. Effectiveness of Warhead Against B-29 Wing.

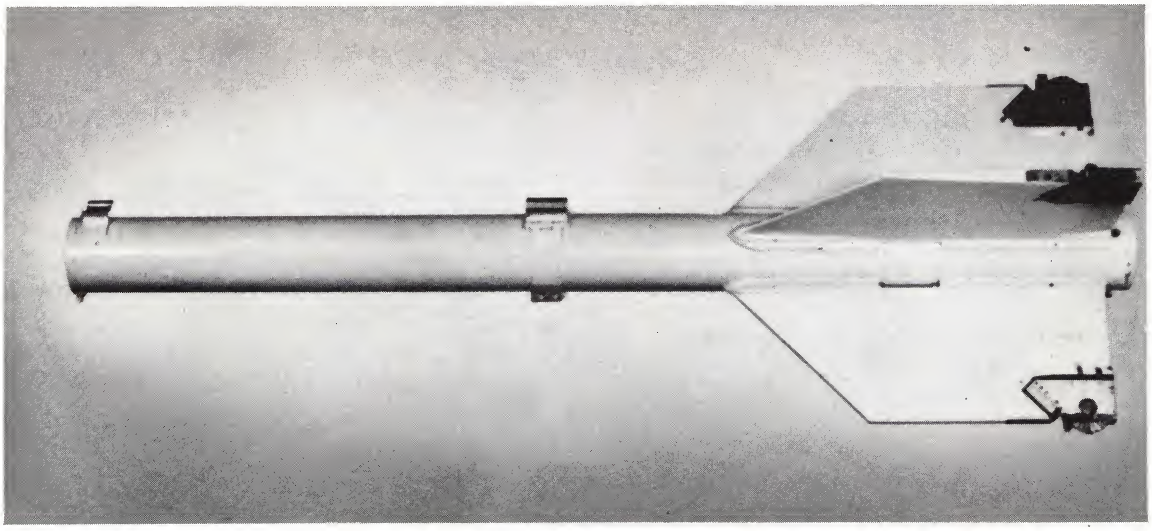


Figure 1-11. Motor Mk 36 With Wings.

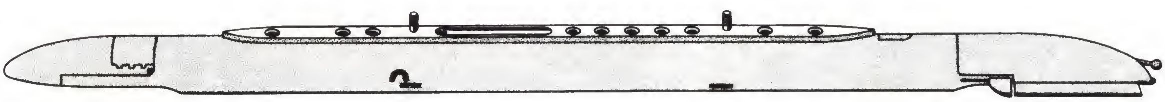


Figure 1-12. LAU-7/A Launcher.

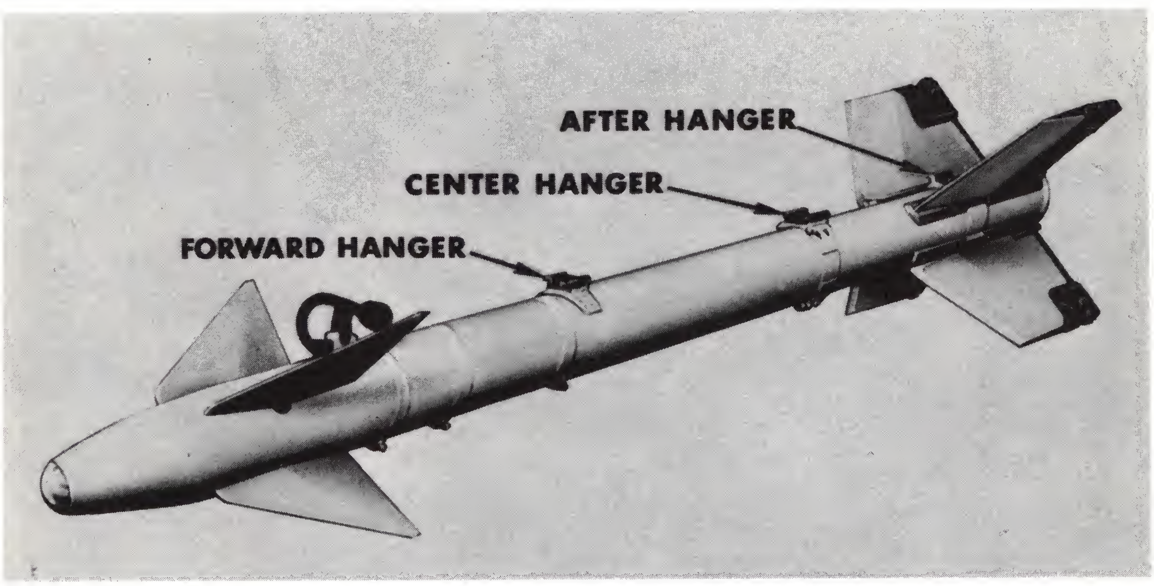


Figure 1-13. Missile Hangers or Lugs.

suspended from the launcher rail by three hangers or lugs, figure 1-13.

A power supply built into the launcher supplies the proper electrical requirements for both versions of the missile, after aircraft turn-up and until the missile is fired. A gas bottle (coolant tank) in the launcher holds the high-pressure nitrogen or air supply for cooling the detector of the IR missile, figure 1-14.

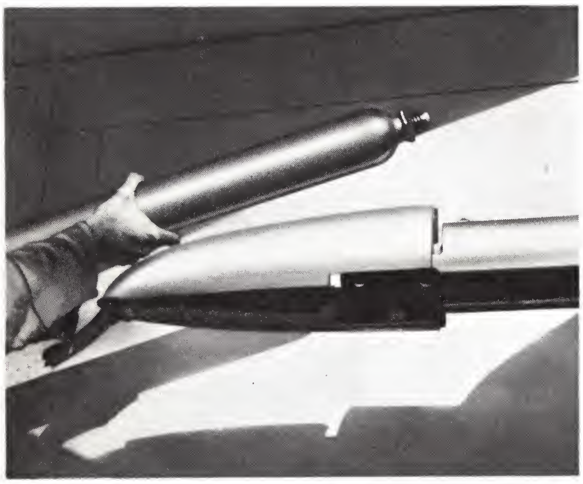


Figure 1-14. Bottle Used to Cool Detector of Infrared Missile.

An ON-OFF cooling switch is in the cockpit of most aircraft for the pilot to start the flow of coolant air to the IR missile. This permits the pilot to conserve the coolant supply in case of an especially long mission. About 1 minute is needed for the detector to cool to operating conditions.

If no coolant switch is provided in the aircraft cockpit, the airflow to the seeker begins as soon as the aircraft is started up, and under normal circumstances provides satisfactory cooling for 2 hours.

The launcher provides for jettisoning the missile by applying firing power to the motor only when the jettison switch is selected, and the missile then fires as an unguided, unarmed rocket.

In addition to the Sidewinder 1C, the LAU-7/A launcher can carry and launch Sidewinder 1 and 1A missiles.

1-3 REFERENCED DOCUMENTS

The following publications contain current information on the Sidewinder 1C (AIM-9C and AIM-9D) missiles:

1. Bureau of Naval Weapons. Sidewinder 1C Guided Missile (AIM-9C); Description, Operation, and Handling (U), Washington, D.C., 1 December 1964, NAVWEPS OP 3351, CONFIDENTIAL.

2. Bureau of Naval Weapons. Sidewinder 1C Guided Missile (AIM-9D); Description, Operation, and Handling (U), Washington, D.C., 1 December 1964, NAVWEPS OP 3352, CONFIDENTIAL.

3. U.S. Naval Ordnance Test Station. AIM-9C Aerodynamic Envelopes, by B. A. Fouse. China Lake, Calif., NOTS (NAVWEPS Report 8486), CONFIDENTIAL (to be published).

4. U.S. Naval Ordnance Test Station. Preliminary Performance Data, Sidewinder 1C Mk 29 (C), by Gisela W. Ritter, China Lake, Calif., NOTS, 16 October 1959. (IDP-777), CONFIDENTIAL.

5. Bureau of Naval Weapons. Guided Missile Launcher Model LAU-7/A, Handbook of Operation and Maintenance Instructions (U), Washington, D.C., NAVWEPS 11-75A-26 (Latest Revision).

6. Naval Photographic Center. AIM-9C—AIM-9D Air Intercept

Missiles (Sidewinder 1C) Pilot Orientation and Operational Techniques (U), Washington, D.C., 1964, Technical Film MN9996a, CONFIDENTIAL.

Chapter 2

NORMAL OPERATING PROCEDURES

The AIM-9D (infrared) missile may be fired without the aid of AI radar. The AIM-9C (radar) missile, however, can only be fired from aircraft equipped with X-band radar and specifically configured for the AIM-9C system.

On some aircraft, therefore, it is possible to carry a mixed load of Sidewinder 1C missiles. With a mixed load, the pilot can launch attacks from any direction and under all weather conditions.

2-1 PREFLIGHT PROCEDURES FOR AIM-9D AND AIM-9C

2-1.1 BEFORE ENTERING THE COCKPIT. Check each missile and missile launcher as follows:

a. Launcher detent-safety pin in place in each launcher, figure 2-1, to prevent inadvertent firing of the missile while on the deck.

b. Dome covers in place on missile GCGs, figure 2-1. Covers on AIM-9D missile cage seeker gyros magnetically to protect them from damage when aircraft power is not supplying electrical caging. Covers on AIM-9C missiles protect electronics from stray RF energy.

c. Fuze cover in place on each missile that contains an IR fuze, figure 2-1.

d. Canard fins for freedom of movement, figure 2-1.

Figure 2-1. Dome and Fuze Covers, Detent-Safety Pin, and Canard Fins Checked.

e. Colored number code of crystal oscillator installed in each AIM-9C missile GCG, figure 2-2.

f. Missile wings securely attached and rollerons caged, with wheels free to turn, figure 2-3.

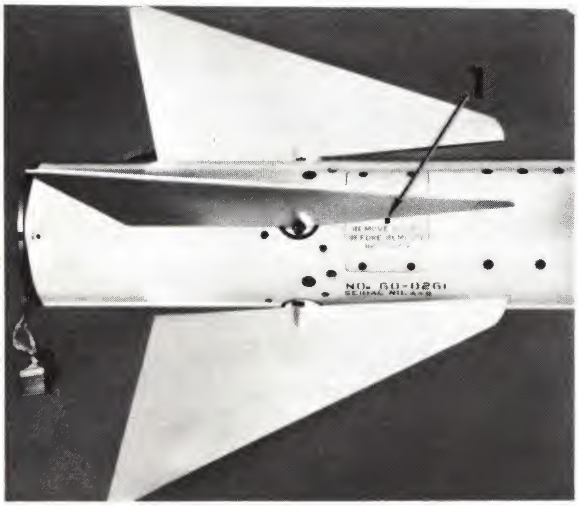


Figure 2-2. Color Code of Crystal Oscillator Checked.

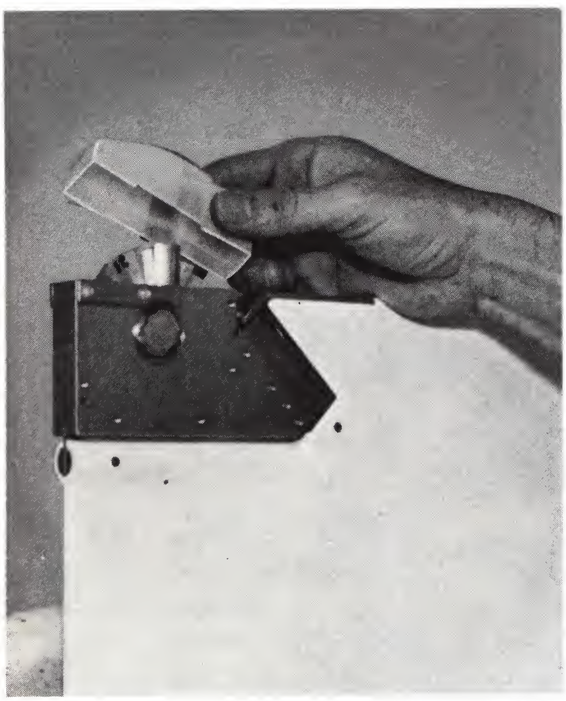


Figure 2-3. Wings and Rollerons Checked.

g. Gas bottle (coolant tank for air/nitrogen) installed in launchers carrying AIM-9D missiles, and bottle pressure reading approximately 3000 pounds (in green area), figure 2-4.

2-1.2 UPON ENTERING THE COCKPIT. Check the following items before lighting off the engine.

a. Master Armament Switch	OFF
b. Missile Selector Switch	OFF

CAUTION: In some aircraft if the jettison switch is in the ON position, the missiles will launch as unguided rockets immediately after the landing gear retracts.

c. Missile Jettison Switch	OFF
d. Coolant Switch	OFF

e. Color code of crystal oscillator installed in aircraft synchronizer to control aircraft radar frequency, identical with that installed in each AIM-9C missile.

2-1.3 AFTER ENGINE LIGHTOFF. Complete the following steps to ensure proper missile operation.

2-1.3.1 AIM-9D Missiles. For this missile the steps are as follows:

a. Coolant Switch	ON
b. Missile Selector Switch	AIM-9D Station
c. IR Selector Light	Illuminated

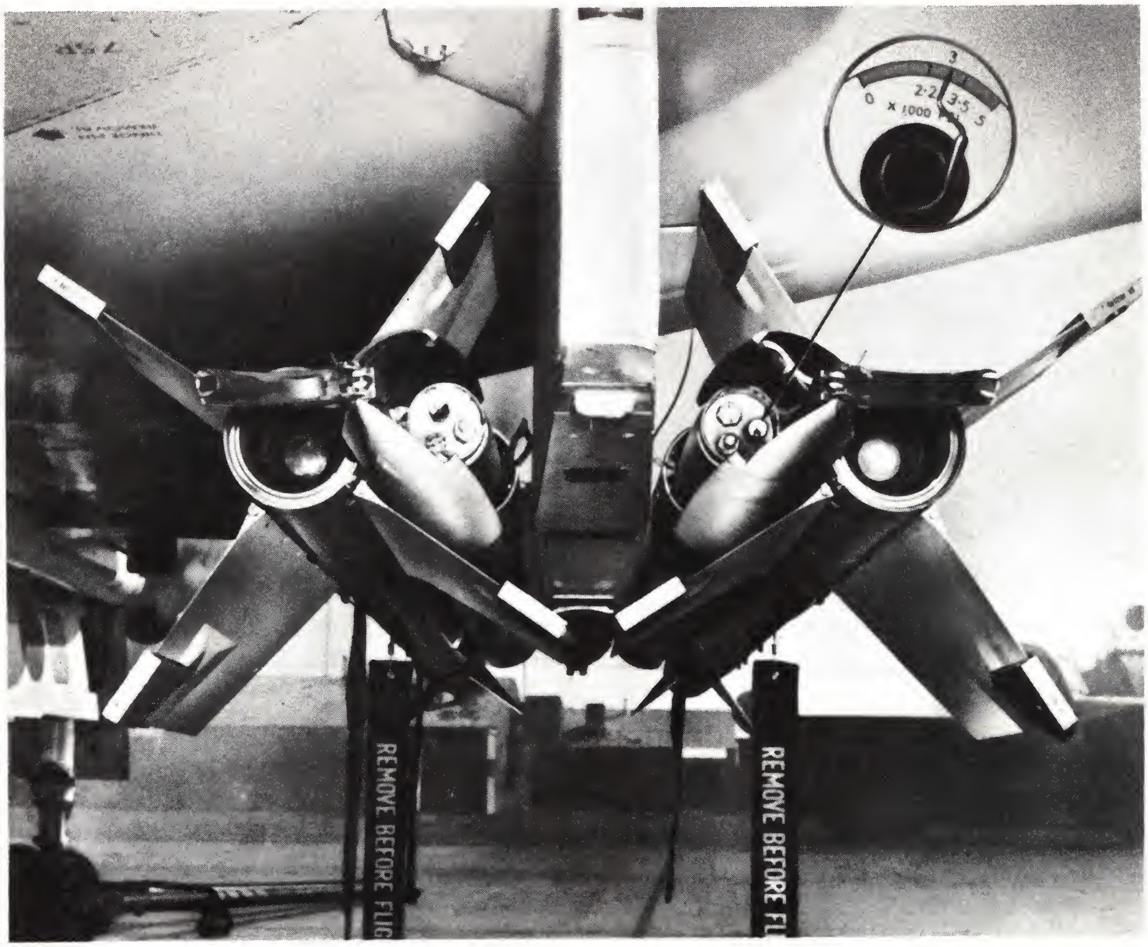


Figure 2-4. Gas Bottle Installed and Pressure Reading Checked.

d. Increase missile audio tone rheostat until an audible background noise is heard.

e. Check for characteristic low-pitched growl (similar to tone from AIM-9B, Sidewinder 1A) as light source is waved in front of the missile dome.

f. If mission will require more than 2 hours, turn coolant switch OFF until needed.

2-1.3.2 AIM-9C Missile. For this missile the steps are as follows:

a. Missile Selector Switch	AIM-9C Station
b. Radar Selector Light	Illuminated

2-2 IN-FLIGHT PROCEDURES

CAUTION: Before takeoff, get a positive indication that all dome covers, fuze covers, and launcher detent-safety pins have been removed.

2-2.1 AFTER TAKEOFF, AIM-9D MISSILE. Normally, no in-flight checks of this missile are needed after takeoff. It is only necessary to set the audio signal at a comfortable background noise level. If the coolant switch has been turned OFF to conserve the supply of nitrogen/air, approximately 1 minute is required for

the missile detector to cool to operating conditions when the coolant switch is turned ON again.

CAUTION: If the coolant switch is left OFF inadvertently, the missile will be incapable of detecting IR targets.

2-2.2 AFTER TAKEOFF, AIM-9C MISSILE. The following steps are required for this missile after takeoff:

a. AI Radar — ON

b. Missile Selector Switch — AIM-9C Station

c. Radar Selector Light — Illuminated

d. The missile is tuned to the aircraft radar frequency by holding the spring-loaded missile-radar tuning switch to LO for 30 seconds, then to HI until the tuning meter needle rises sharply to a maximum, figure 2-5. Release switch, and check that needle remains up. If it does not, then repeat the procedure. If while tuning HI, the needle passed through two maximums, stop and tune LO until back through these maximum deflections, then tune HI again carefully to ensure stopping at the first maximum.

e. Once each missile is tuned properly, no further checks of the missile are normally required during the flight, other than to ensure that the meter needle position is above half scale. However, the tuning procedure should be repeated whenever radar is returned to operation from Standby or OFF.

f. Check for characteristic 1200-cps audio signal by locking on to the altitude line.

2-3 INTERCEPT PROCEDURES

To complete a successful intercept with either version of the Sidewinder 1C missile, it is necessary to meet two basic requirements:

a. Receive a solid missile audio signal from the target.

b. Be within the appropriate missile firing envelope.

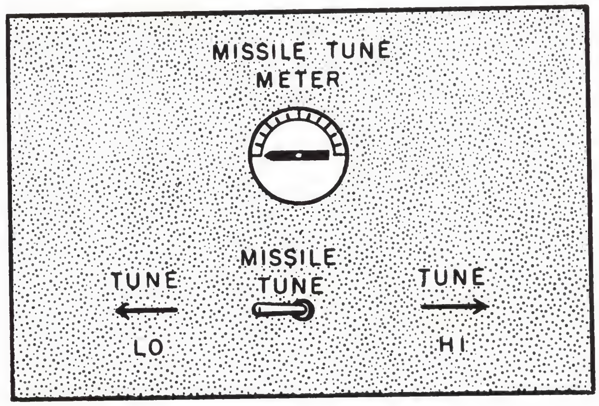
2-3.1 AIM-9D MISSILE. This missile is optimized for conducting attacks from the rear hemisphere; however, if the need arises and your aircraft is equipped with the deviated pursuit computer, it can be used very effectively in a forward-hemisphere attack against a target operating in afterburner. Important points to remember when conducting any intercept with this missile are as follows:

a. Approach the target from below while attempting to hold it against a blue sky background. Although this is not as important as it is with the Sidewinder 1 and 1A (AIM-9A and AIM-9B), it will ensure target detection by the missile at much greater ranges. As an example, the distance a target can normally be detected by the missile against a blue sky background is almost double that of the same target against a cloud background.

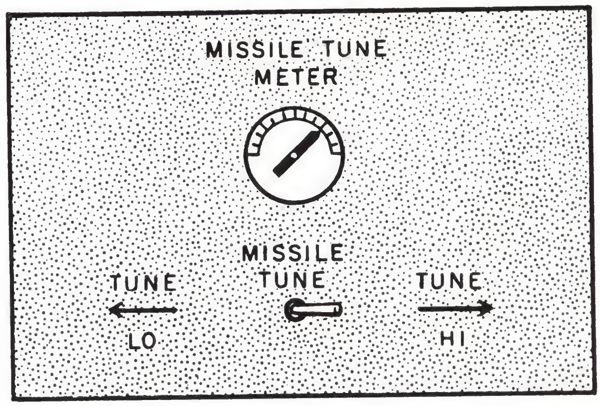
b. Keep the target within 25 mils of the fixed pipper before firing. This ensures that you are receiving target infrared signal and not background. With the target source thus well within the seeker field-of-view, maximum available signal and optimum guidance are assured.

c. There is no requirement that the target be tracked for a specified length of time either before or after firing. If within the firing envelope and receiving a definite audio signal from the

First, the spring-loaded tune switch is depressed to the low side and held for 30 seconds.



Then to the high side and held until the meter deflects.



A quick release and the automatic frequency control system of the missile completes the tuning process.

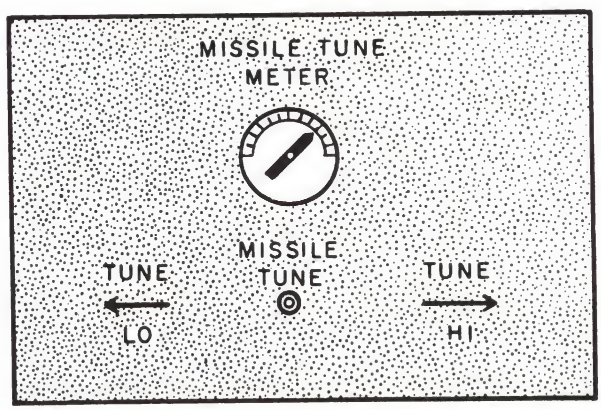


Figure 2-5. Tuning Aircraft Radar Frequency, HI and LO.

target, a snap shot is as effective as a long tracking shot. Keep in mind, however, that there is approximately a 0.8-second delay before the missile leaves the launcher after the trigger is pulled. It is not necessary to continue to hold the trigger until the missile has launched.

d. There is a definite null in audio signal if in detection range and the missile boresight is directly in line with the IR source. This null is approximately 5 mils in diameter and may not coincide with the fixed pipper, but this deviation will seldom exceed 10 mils.

e. It is very possible to be receiving an audio signal from a target when outside the maximum firing range of the missile. The sensitivity of the seeker has been increased to such an extent that under normal circumstances the missiles will detect targets at twice the maximum possible firing range. This improved seeker sensitivity may, at first, cause some concern when, on occasions, it is discovered that the missile is detecting radiation from the contrails of a distant target rather than from the target itself. Be sure to wait until within the maximum firing range of the missile before squeezing the trigger.

f. The missile cannot be fired under all weather conditions. Although extremely effective for day or night intercept work, the missile cannot be fired at targets obscured by clouds. Clouds diffuse IR radiation, and no target signal will reach the seeker.

g. The missile cannot be fired at a target heading into the sun. The radiation from the sun may decoy the missile away from the target. Hold off firing until the missiles are pointed at least 30 degrees away from the sun.

h. The minimum firing range is approximately 1000 feet. This is assuming tail-on, co-speed firing conditions and is true at all altitudes. Minimum firing range under conditions other than co-speed can be calculated simply by the formula

$$R_{min} = 1000(1 + 2\ \Delta\ \text{Mach}).$$

For example, if the pilot is running an intercept at Mach 1.5 against a Mach 0.8 target, his minimum firing range would be

$$R_{min} = 1000\left[1 + (2)\ (0.7)\ \text{Mach}\right]$$

or 2400 feet.

i. There is no requirement to stay within specified *g* limits while tracking or firing. The missile seeker telescope now has a gimbal angle of 40 degrees in any direction. This makes it possible to launch from such large angles-off that it is no longer necessary to impose *g* limitations on the firing aircraft while tracking or firing.

j. Maximum detection ranges of this missile are a function of the target type, angle-off, power settings, and background. Jet bomber targets will be detected at greater ranges than single jet fighter or attack targets. As angle-off the tail of a jet target is increased, the detection range will decrease correspondingly. The higher the power setting being maintained by the target, the greater the detection range. As a general rule, if the target selects afterburner, the detection range will double. Detection range with the target boresighted against a blue sky background will be almost double that of one boresighted against a cloud or against the ground.

2-3.2 AIM-9C MISSILE. This missile is optimized for attacks from the forward hemisphere, but it can be used very effectively in rear-hemisphere attacks. This is especially true under circumstances that would preclude using the AIM-9D missile (that is, when the target is in the clouds or heading into the sun). Important points to remember when conducting an intercept with this missile are as follows:

a. Attacks from the forward hemisphere can normally be made only by aircraft equipped with the deviated pursuit computer or some means of switching the navigational constant. At the time of firing, the deviated pursuit computer automatically changes the navigation constant and fuzing delay of the missile to ensure a successful head-on intercept capability. If a head-on firing capability is needed, and deviated pursuit computers are not a part of the weapon system, the missile must be precommitted on the ground before loading it aboard the aircraft.

b. The aircraft radar must be locked on before the missile can see the target and provide an audio signal. A steady audio signal is an indication that the missile is range-tracking the target and can be successfully launched when within the maximum aerodynamic firing envelope.

c. It is not necessary to keep the target boresighted exactly to ensure a kill. When within missile detection range of a target, a steady audio signal will be heard whenever the missile boresight is within 200 mils of the target. However, the closer the missile seeker is boresighted to the target, the greater the chance of a successful intercept.

d. The target must continue to be tracked after firing the missile. When inside the firing envelope and receiving steady audio signal, the missile may be fired. The target must continue to be illuminated, however, until missile intercept.

e. Do not fire while the target is passing through the altitude line. The altitude line is the radar return from the earth's surface which may appear as a target line on the radar scope at a range equal to the altitude. The altitude line is always present whether or not it is displayed on the scope. It is quite possible for the radar and the missile to transfer lock to the altitude line as the target passes through it. Therefore, attempt to complete your attack before the target has closed to within 5000 feet of the altitude line, or hold off firing until the target has passed at least 1000 feet inside the altitude line.

f. The missile may be fired although the AI radar is being jammed. If the radar of the firing aircraft is being jammed by the target, the missile can still be fired in the normal manner and it will automatically home on the radar jammer of the target. After firing, the radar should continue to illuminate the target, using any steering information that is provided.

g. The missile can be fired under all weather conditions. If the target can be acquired and tracked by the aircraft radar, the missile can be fired regardless of weather conditions (clouds, rain, etc.).

h. Minimum firing range is slightly more than that of the IR version. This is 2000 feet for co-speed, tail-on conditions. For overtaking conditions at time of firing, use the formula listed below:

$$R_{min} = 1000(2 + 3\,\Delta\,\text{Mach}).$$

For example, if the pilot is running an intercept at Mach 1.5 against a Mach 0.8 target, his minimum firing range would be

$$R_{min} = 1000\left[2 + (3)\ (0.7)\ \text{Mach}\right]$$

or 4100 feet.

i. Maximum firing ranges of this missile at all altitudes are slightly less than those of the IR version. The maximum aerodynamic ranges of this missile are somewhat less than those of the AIM-9D, because of the relatively blunt hemispherical dome over the radar reflector. Representative aerodynamic envelopes of this missile are presented in chapter 3. A more comprehensive presentation of missile aerodynamic envelopes is given in NAVWEPS Report 8486 (item 3, paragraph 1-3, chapter 1).

j. The maximum detection ranges of this missile are a function of the AI radar and of the specific target under attack. Detection and lock-on ranges vary with the power output of the AI radar. Basically, the larger the AI radar dish, the larger the missile-detection and lock-on ranges. Detection and lock-on ranges are dependent also on size, shape, and angle of approach of the target. The larger the target presentation, the greater the missile lock-on range.

Chapter 3

TACTICAL ENVELOPES

Most aircraft capable of carrying Sidewinder 1C missiles (AIM-9C and AIM-9D) will be equipped with computers or equipment that will give the pilot continuous maximum-range firing information under all intercept conditions. It is considered appropriate, however, to present a series of preliminary aerodynamic launching envelopes for both versions of the missile. These envelopes represent the missile-maneuver limits and the range limits, as determined by the drag, rocket motor performance, and other variables.

As was true with the Sidewinder 1 and 1A, the missile, for successful flight, must have sufficient signal and must be launched from within the appropriate envelope. For more thorough and complete coverage of the aerodynamic launching envelopes of the missiles, refer to items 3 and 4, paragraph 1-3, of this ordnance pamphlet.

3-1 AIM-9D MISSILE ENVELOPES

All envelopes for the AIM-9D missile represent pursuit-launch tail attacks on a nonmaneuvering target at the origin of the coordinate system. Target envelopes are shown in figure 3-1 through 3-12.

CAUTION: These are aerodynamic envelopes only. They do NOT represent seeker performance, which are functions of target characteristics, target aspect, altitude, background, and range.

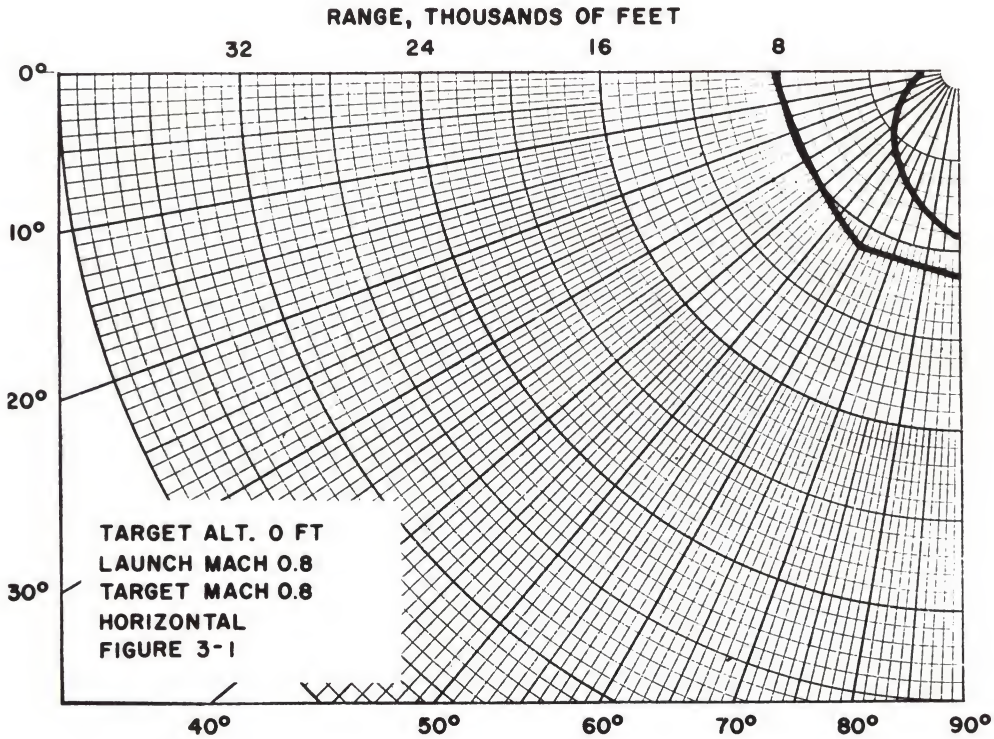
3-2 AIM-9C MISSILE ENVELOPES

The envelopes for the AIM-9C missile represent pure-pursuit attacks from the rear and forward hemispheres against a nonmaneuvering target and are plotted relative to the target.

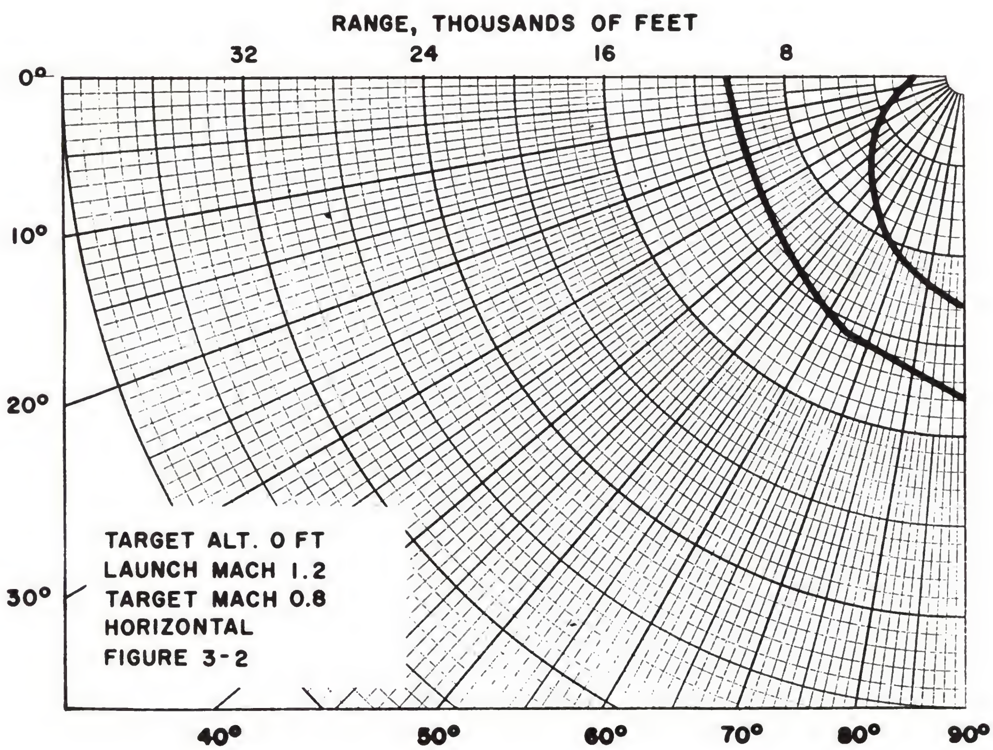
CAUTION: These are aerodynamic envelopes only. They do NOT represent seeker performance limits, which are a function of the AI radar capabilities and configuration of the specific target under attack, not merely its altitude and speed.

As is true of the AIM-9D, the AIM-9C missile must have sufficient audio signal and must be launched from within the appropriate envelope. Representative envelopes are shown in figure 3-13 through 3-28.

AIM-9D Envelopes

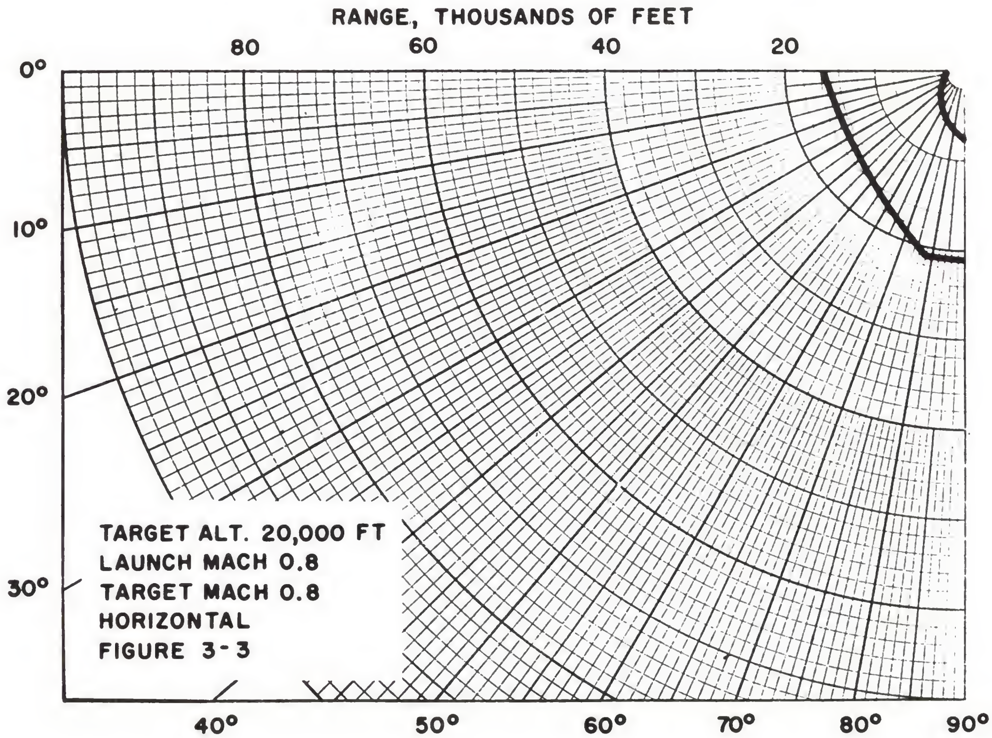


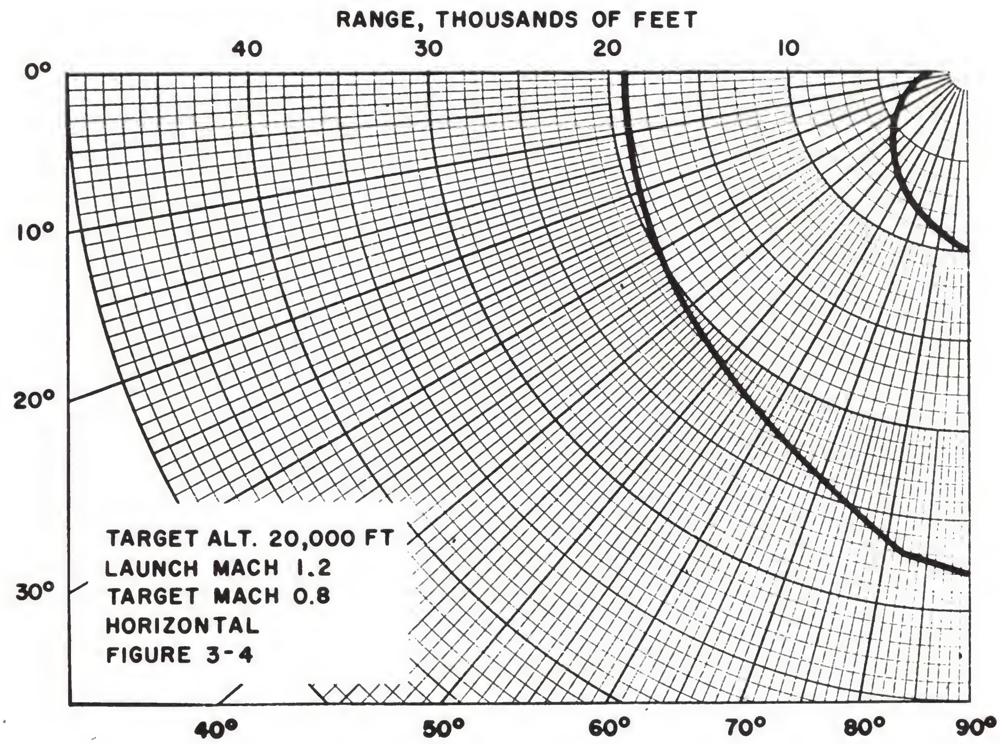
TARGET ALT. 0 FT
LAUNCH MACH 0.8
TARGET MACH 0.8
HORIZONTAL
FIGURE 3-1



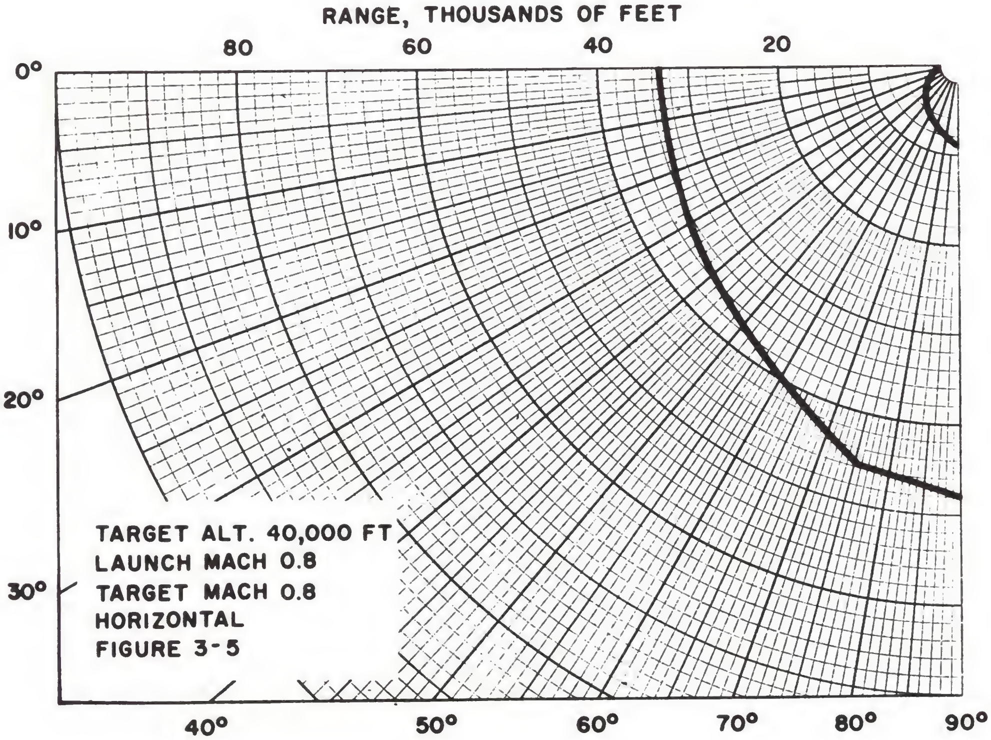
TARGET ALT. 0 FT
LAUNCH MACH 1.2
TARGET MACH 0.8
HORIZONTAL
FIGURE 3-2

AIM-9D Envelopes

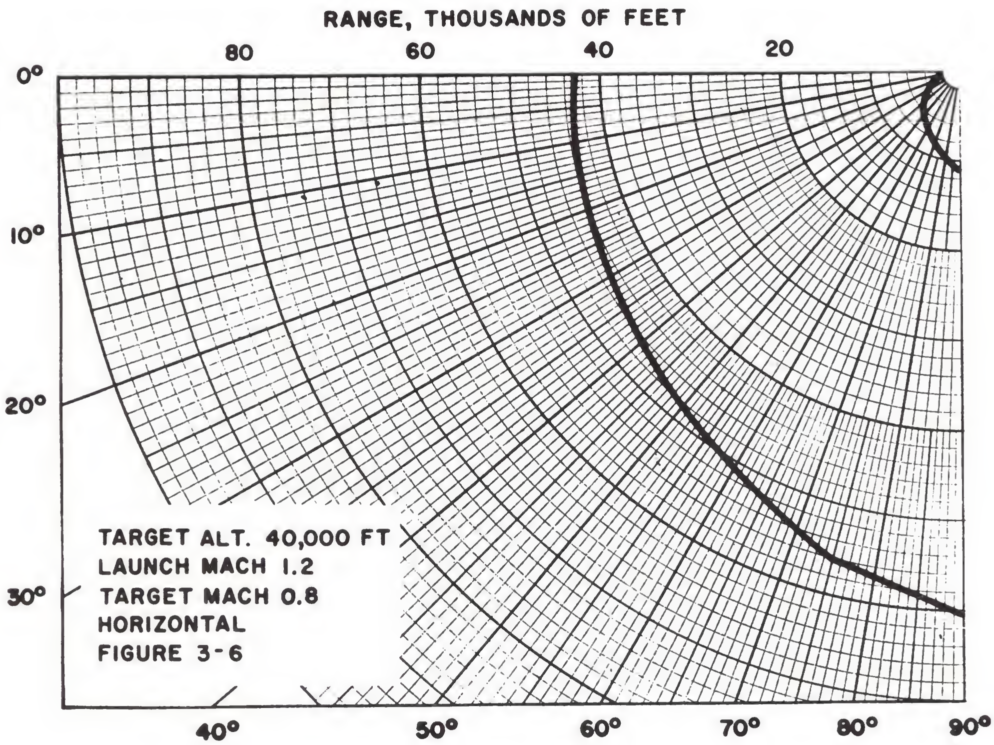




AIM-9D Envelopes



TARGET ALT. 40,000 FT
LAUNCH MACH 0.8
TARGET MACH 0.8
HORIZONTAL
FIGURE 3-5



TARGET ALT. 40,000 FT
LAUNCH MACH 1.2
TARGET MACH 0.8
HORIZONTAL
FIGURE 3-6

AIM-9D Envelopes

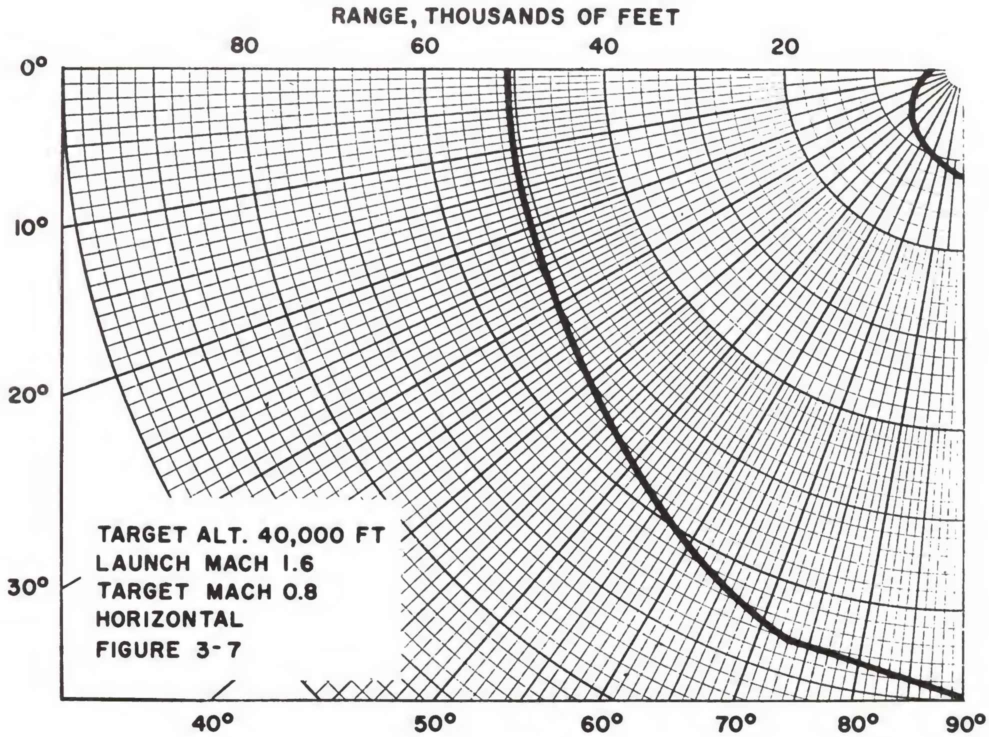


FIGURE 3-7

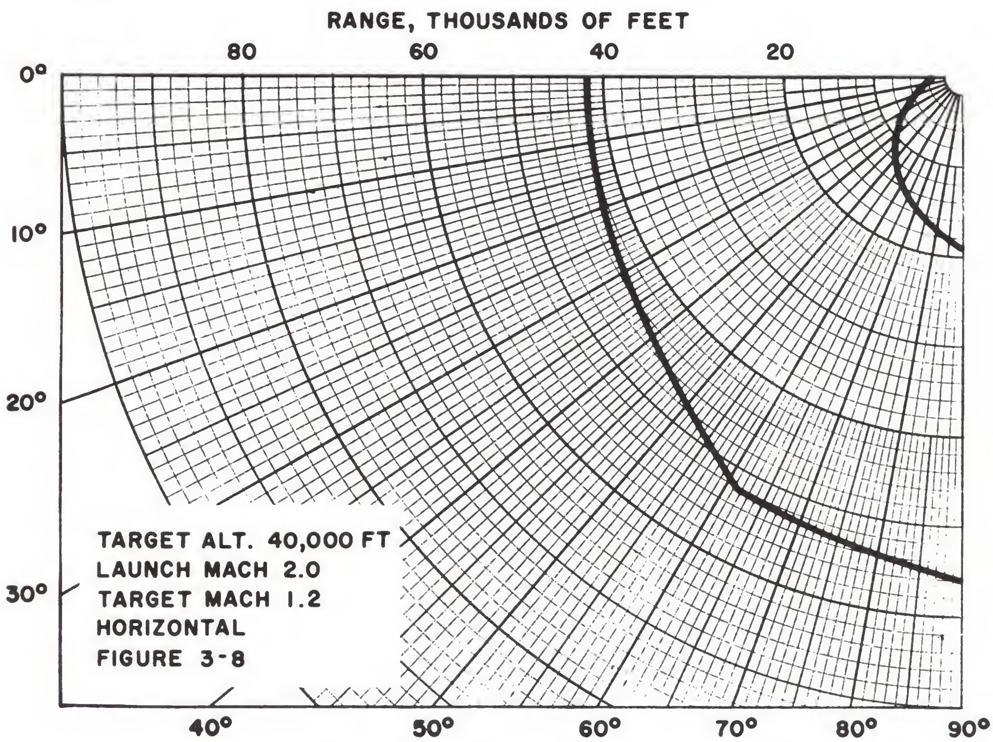
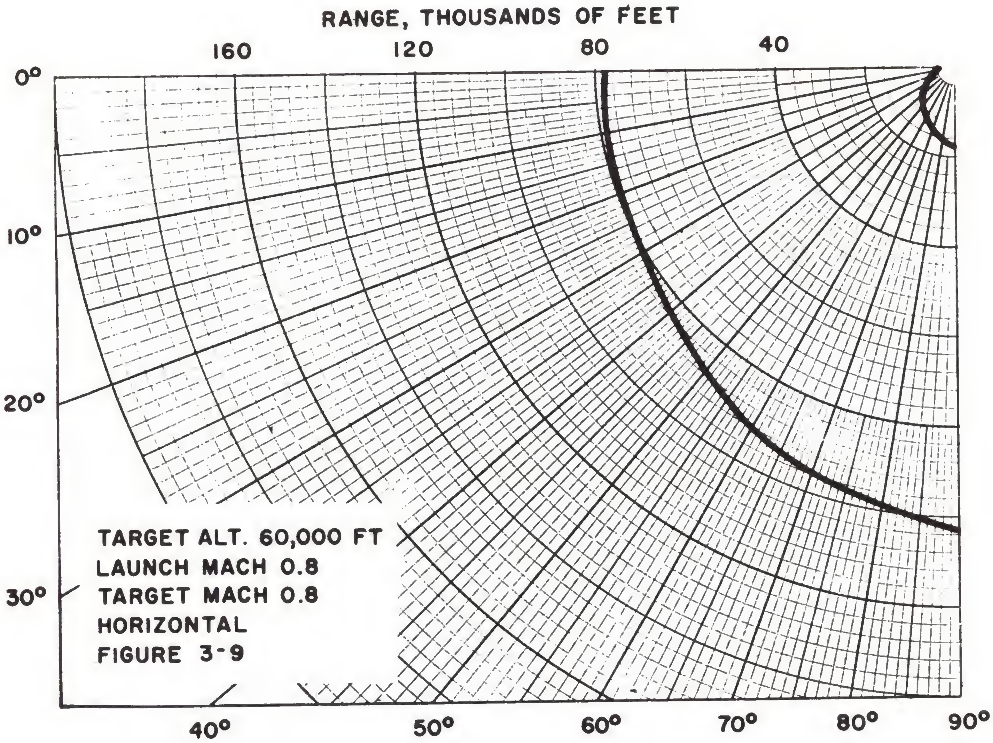
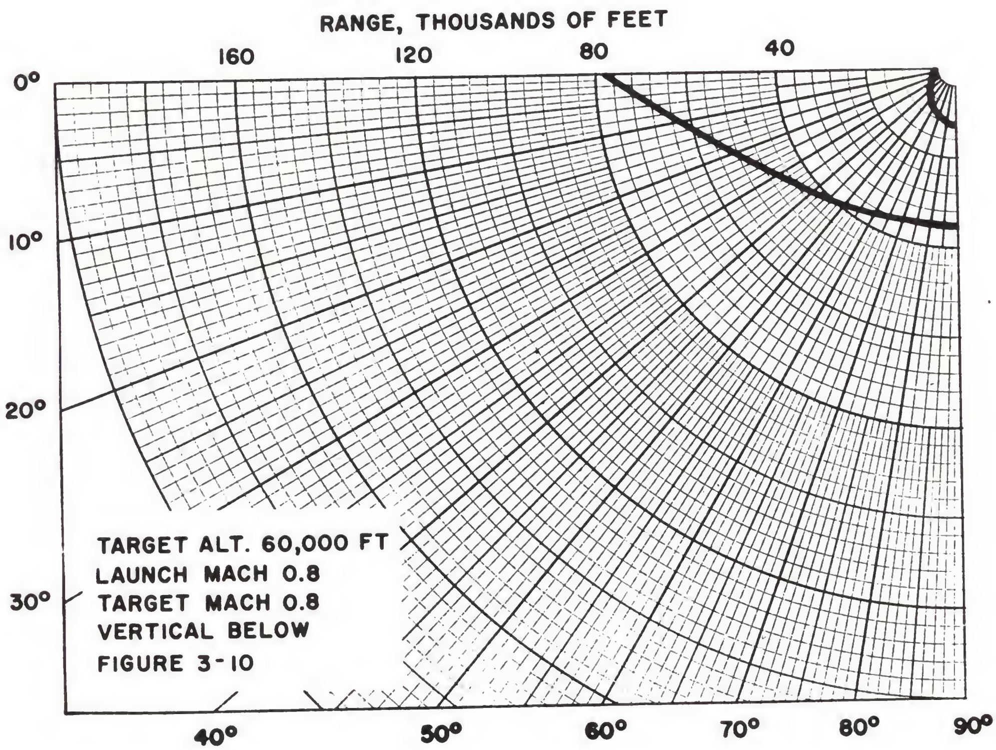


FIGURE 3-8

AIM-9D Envelopes

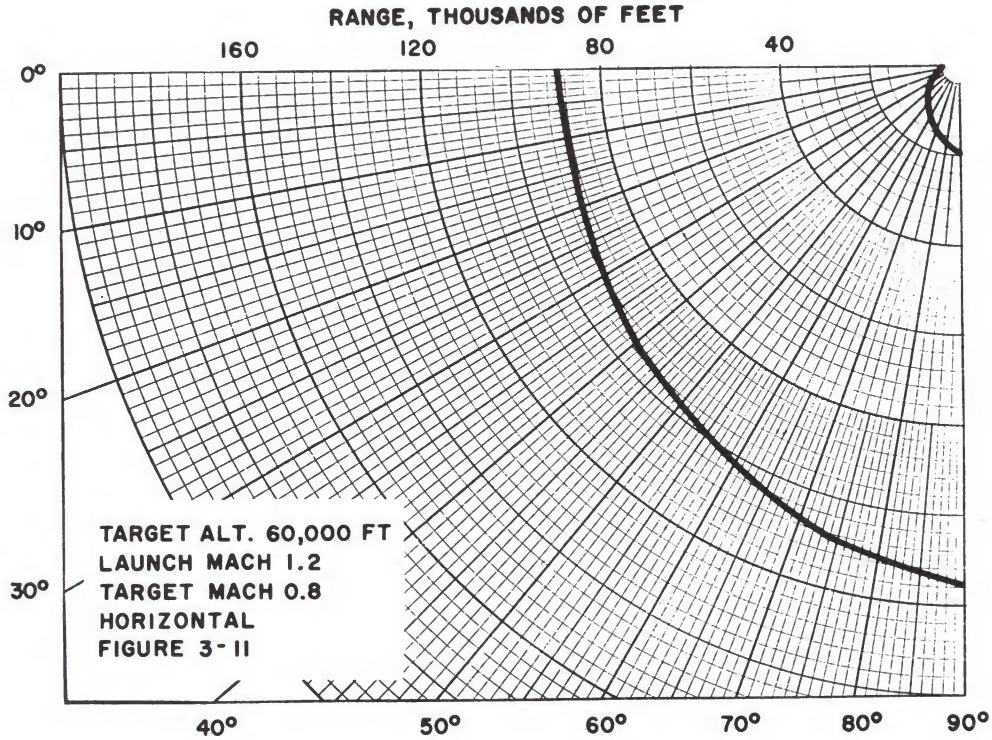


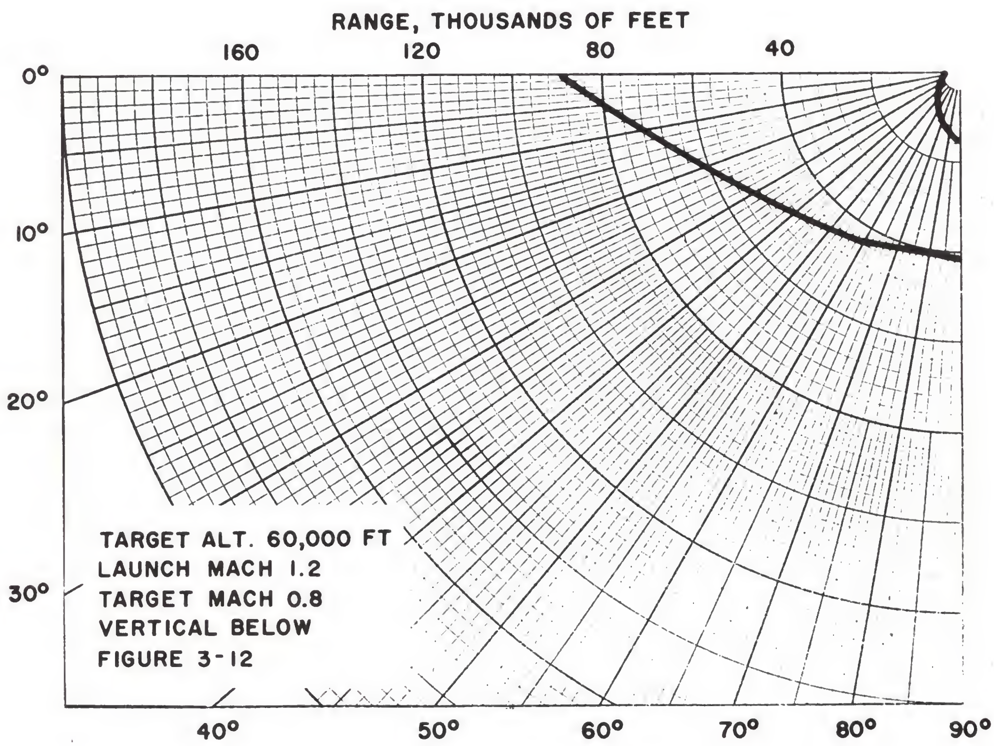
TARGET ALT. 60,000 FT
LAUNCH MACH 0.8
TARGET MACH 0.8
HORIZONTAL
FIGURE 3-9



TARGET ALT. 60,000 FT
LAUNCH MACH 0.8
TARGET MACH 0.8
VERTICAL BELOW
FIGURE 3-10

AIM-9D Envelopes





AIM-9C Envelopes, Tail-On

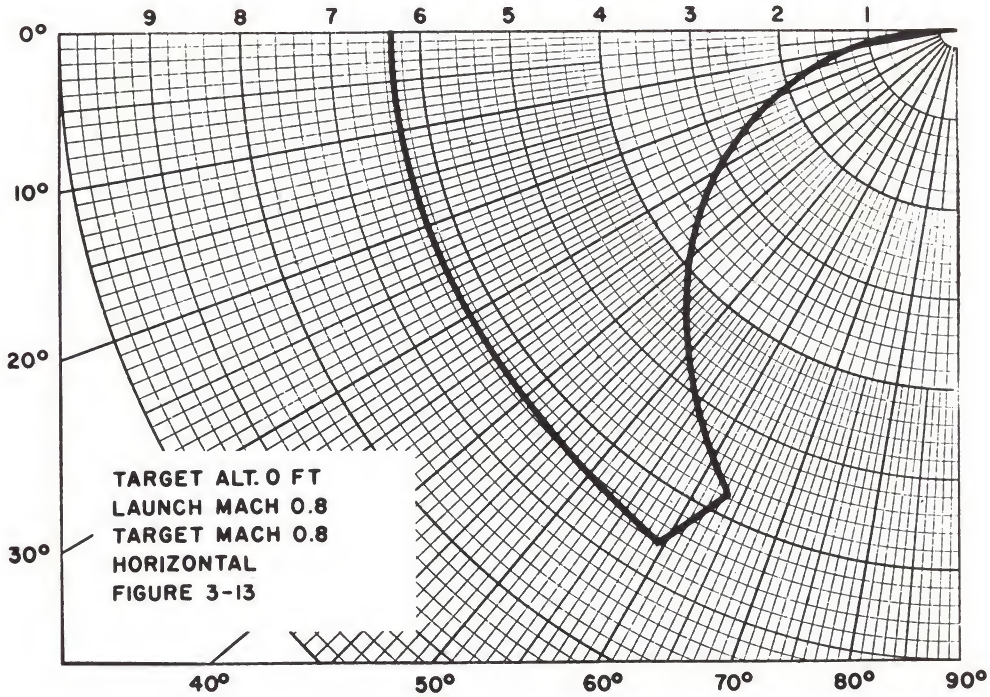


FIGURE 3-13

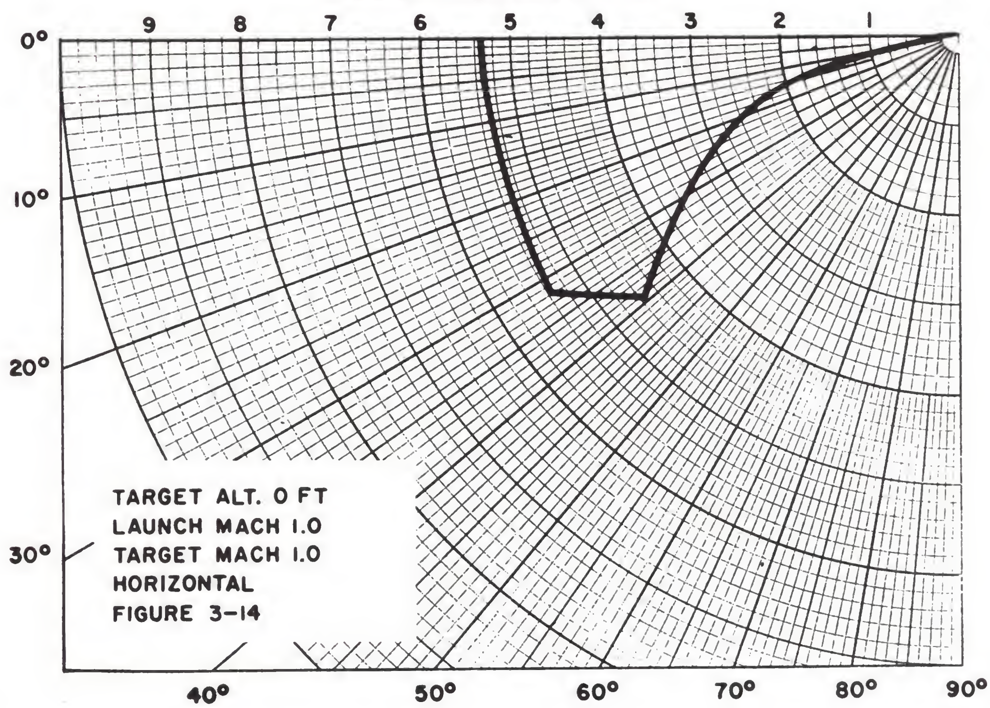


FIGURE 3-14

AIM-9C Envelopes, Tail-On

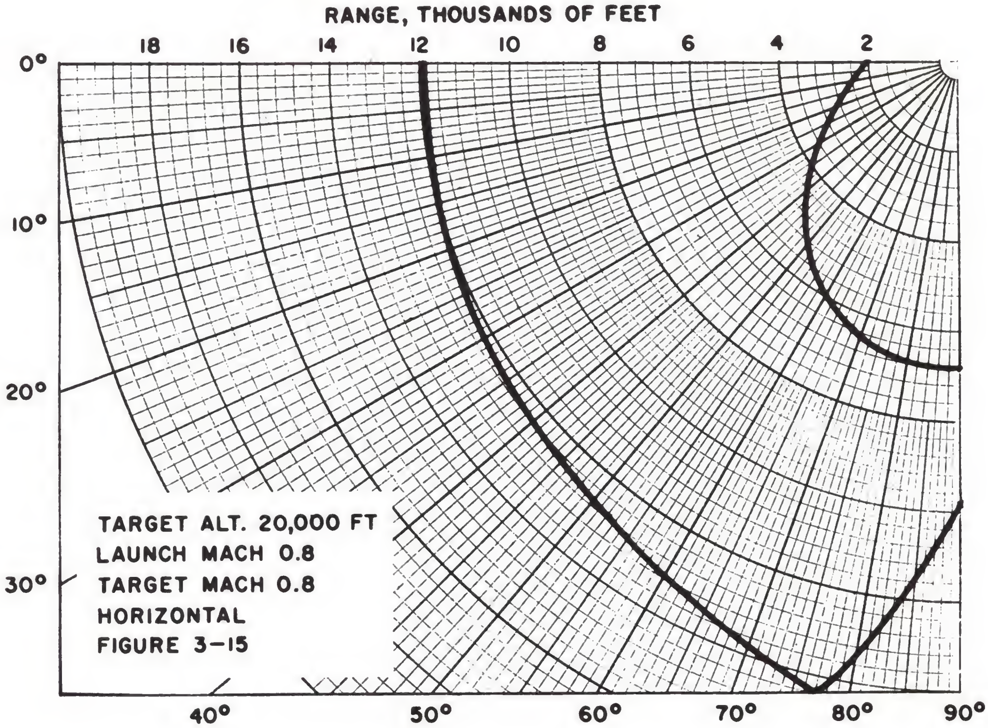


FIGURE 3-15

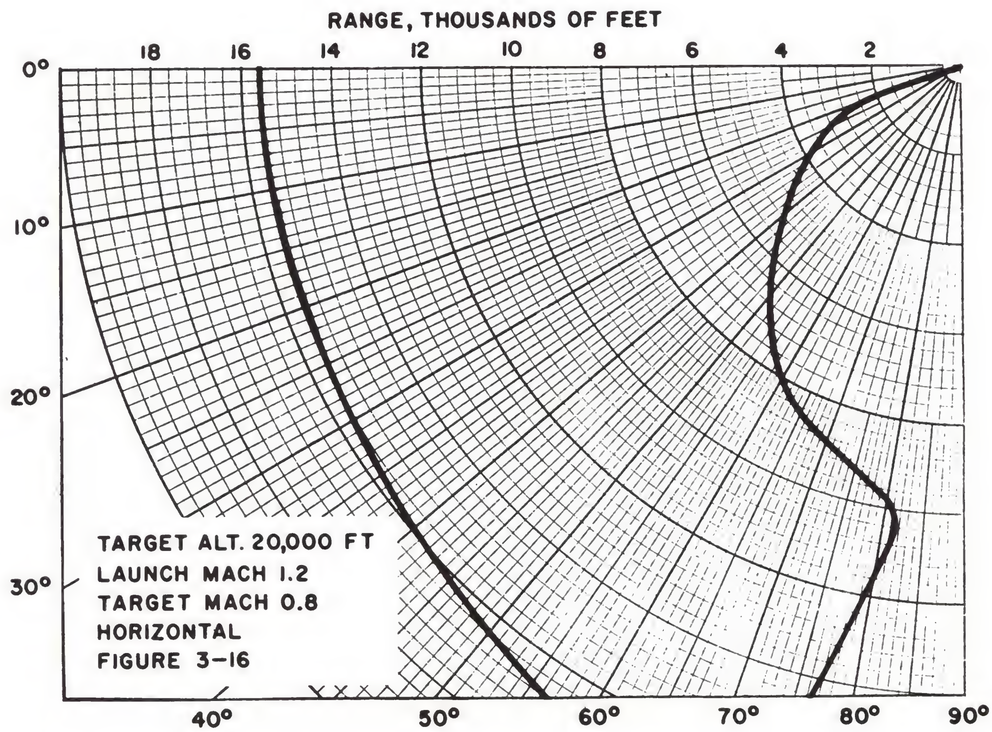
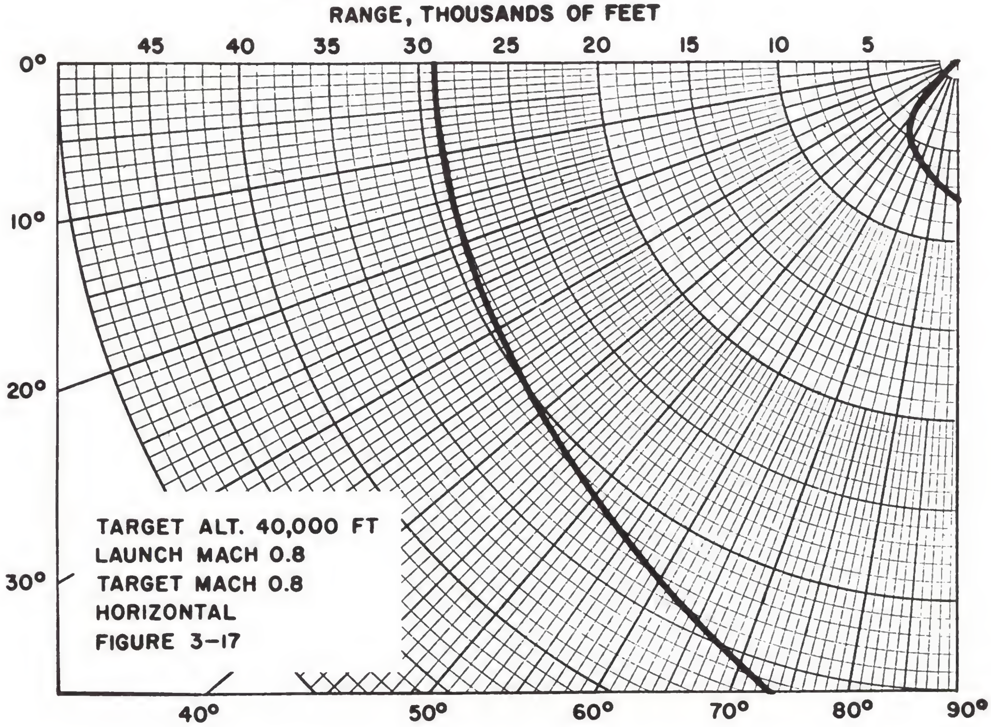
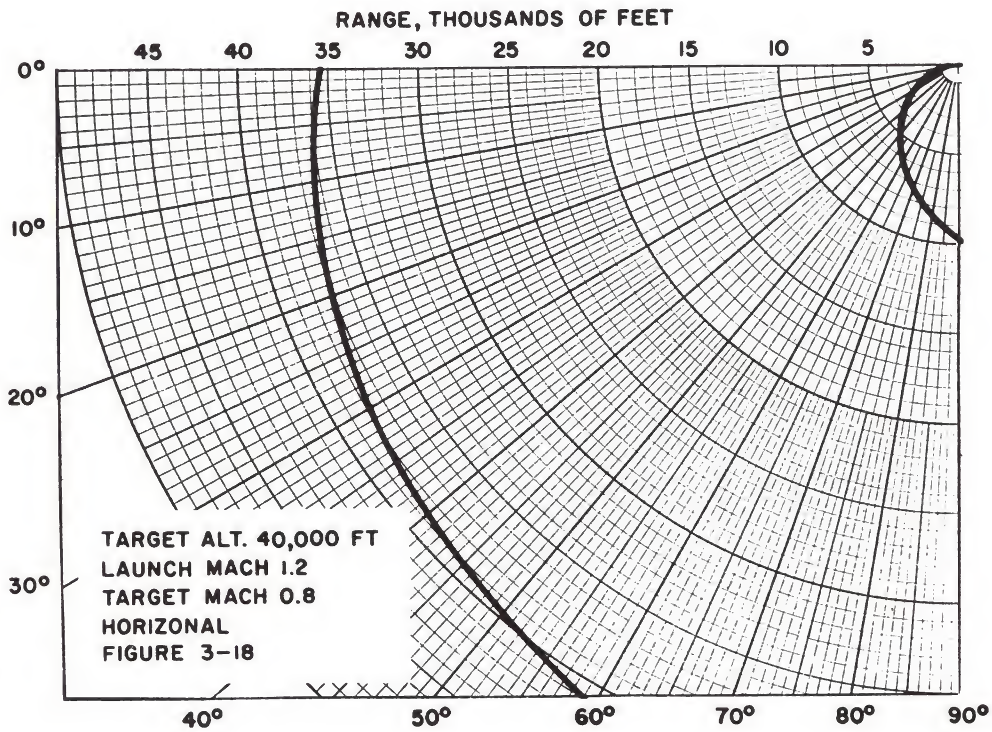


FIGURE 3-16

AIM-9C Envelopes, Tail-On





AIM-9C Envelopes, Tail-On

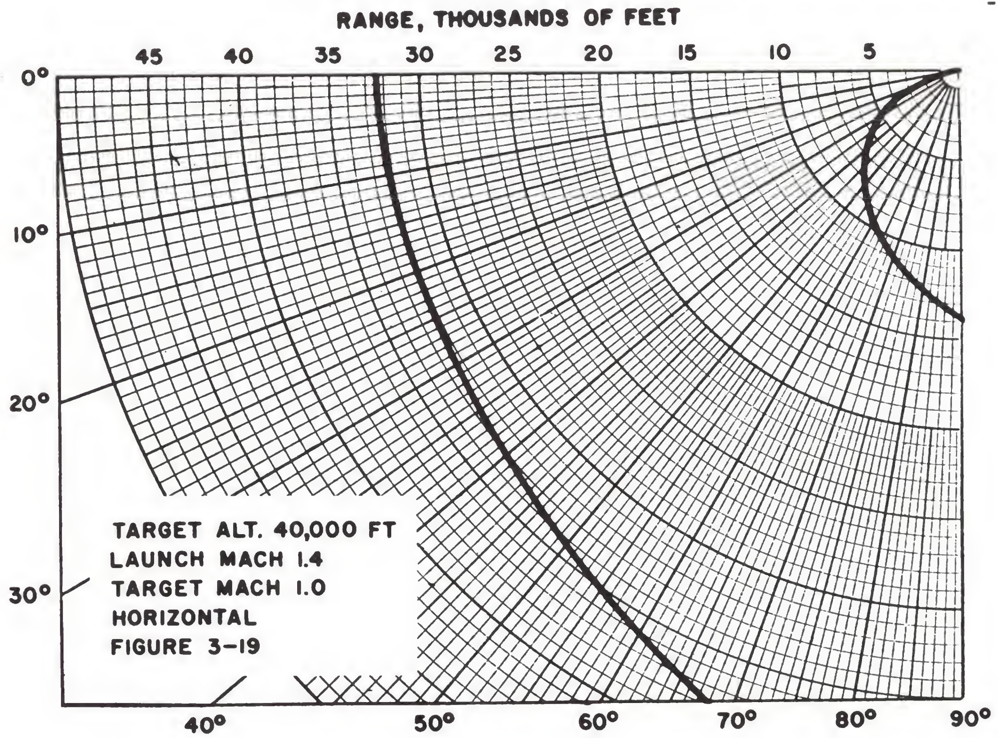


FIGURE 3-19

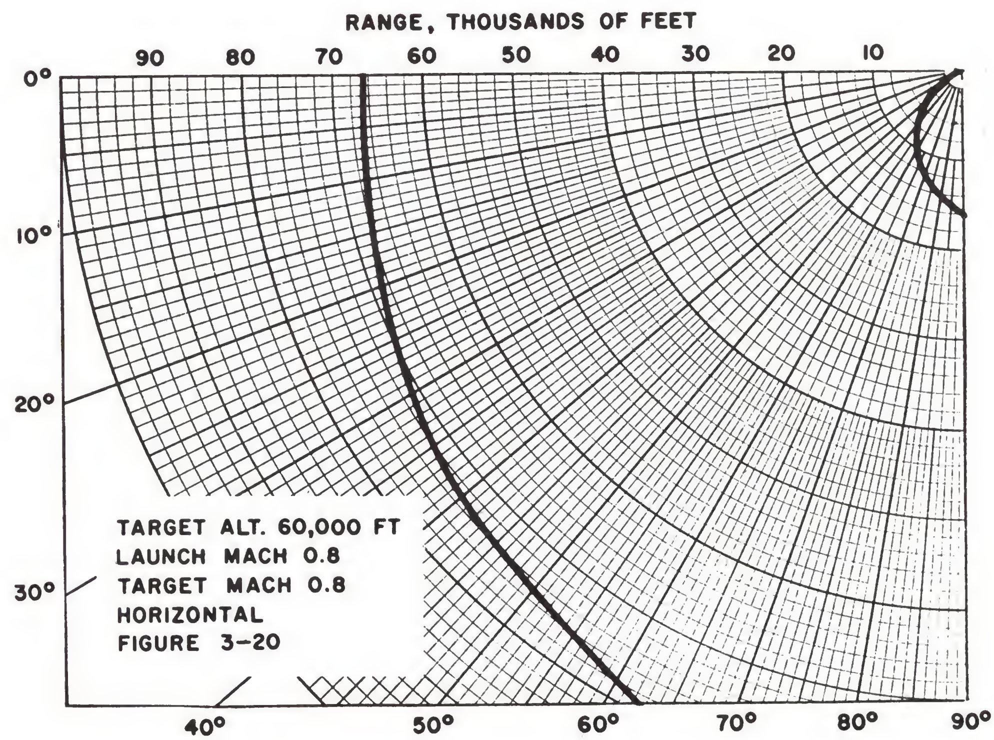
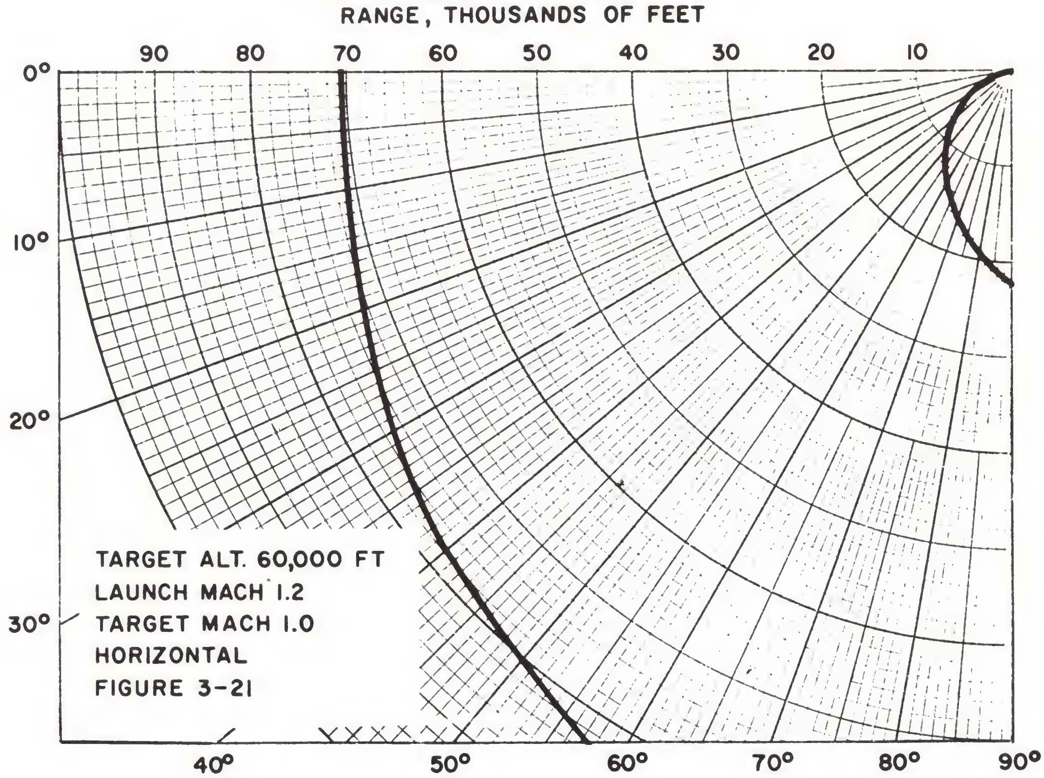
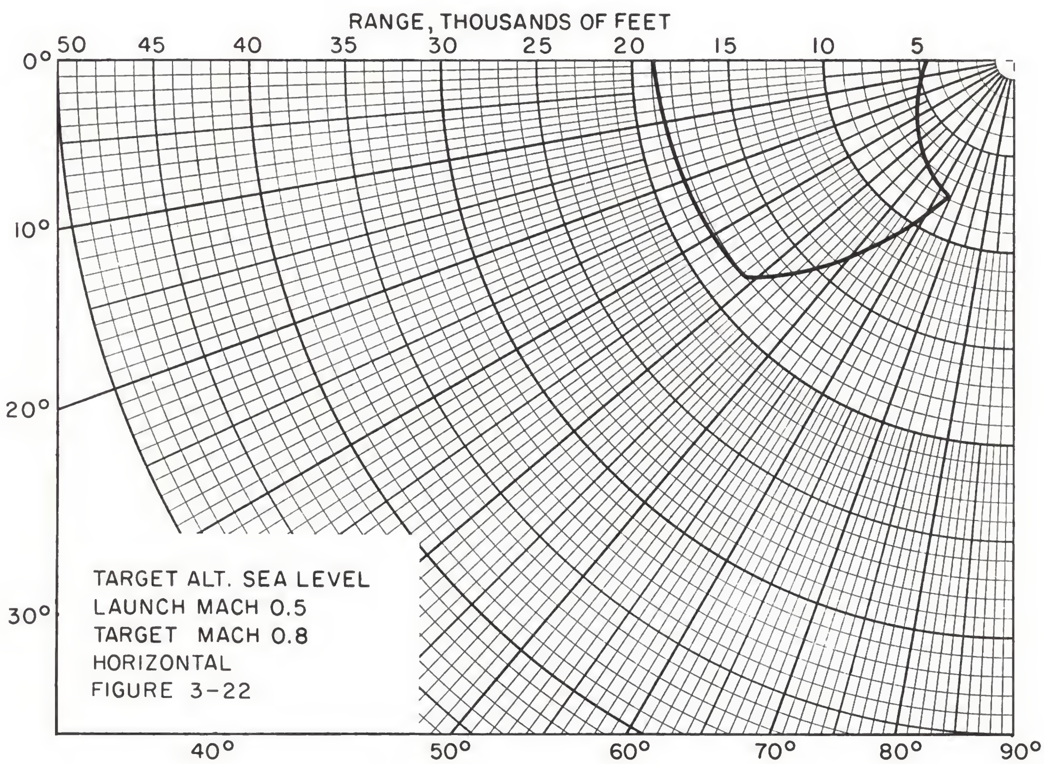


FIGURE 3-20

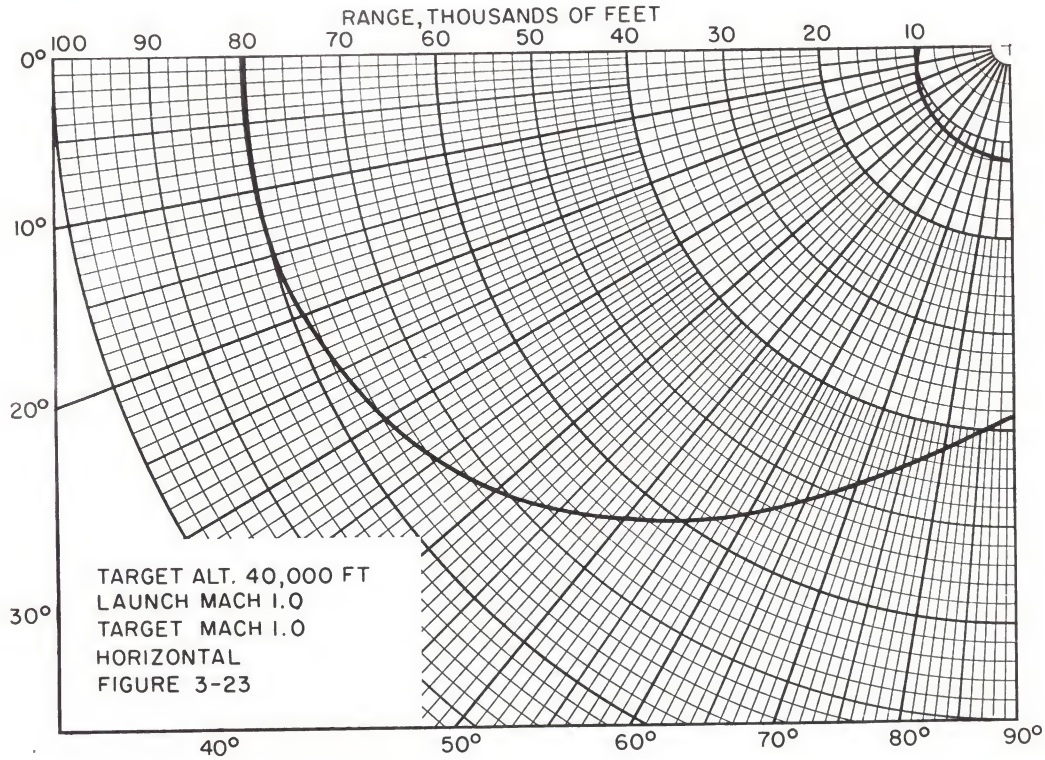
AIM-9C Envelopes, Tail-On

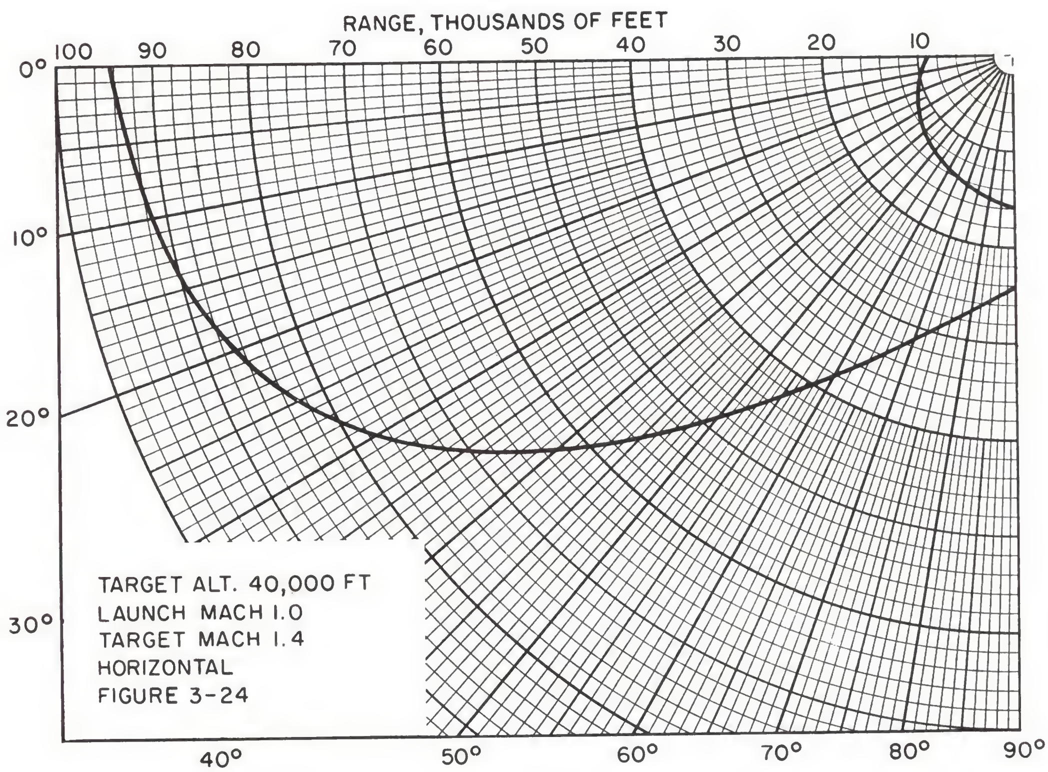


AIM-9C Envelope, Head-On

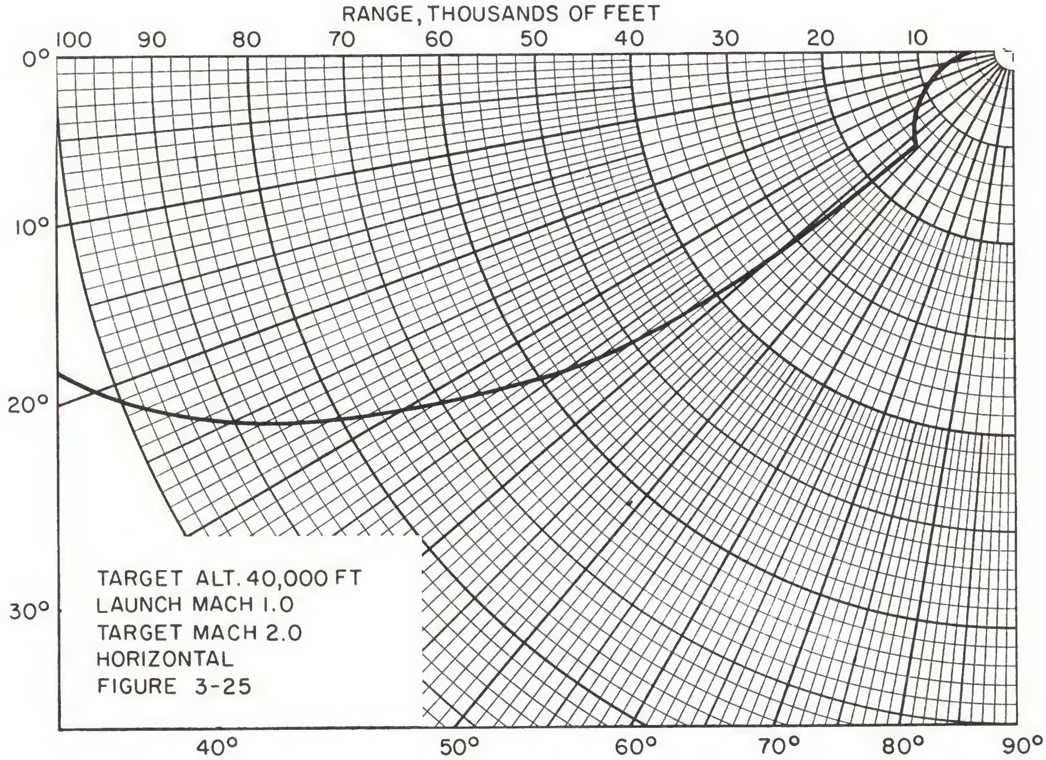


AIM-9C Envelopes, Head-On

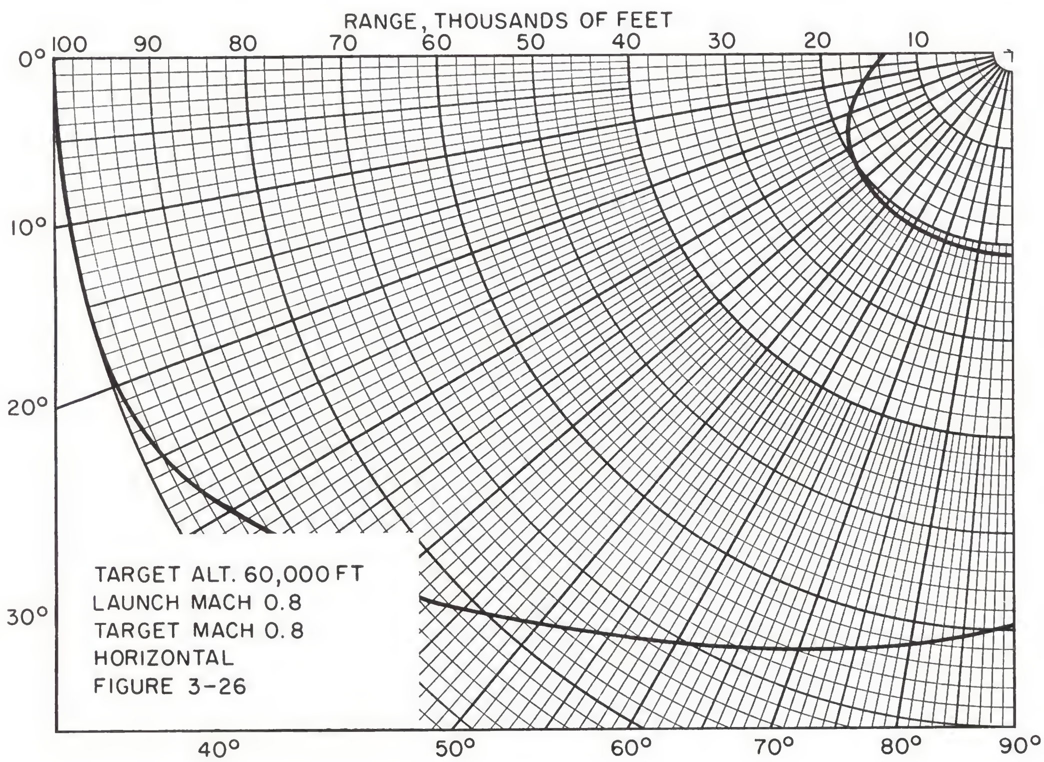




AIM-9C Envelopes, Head-On

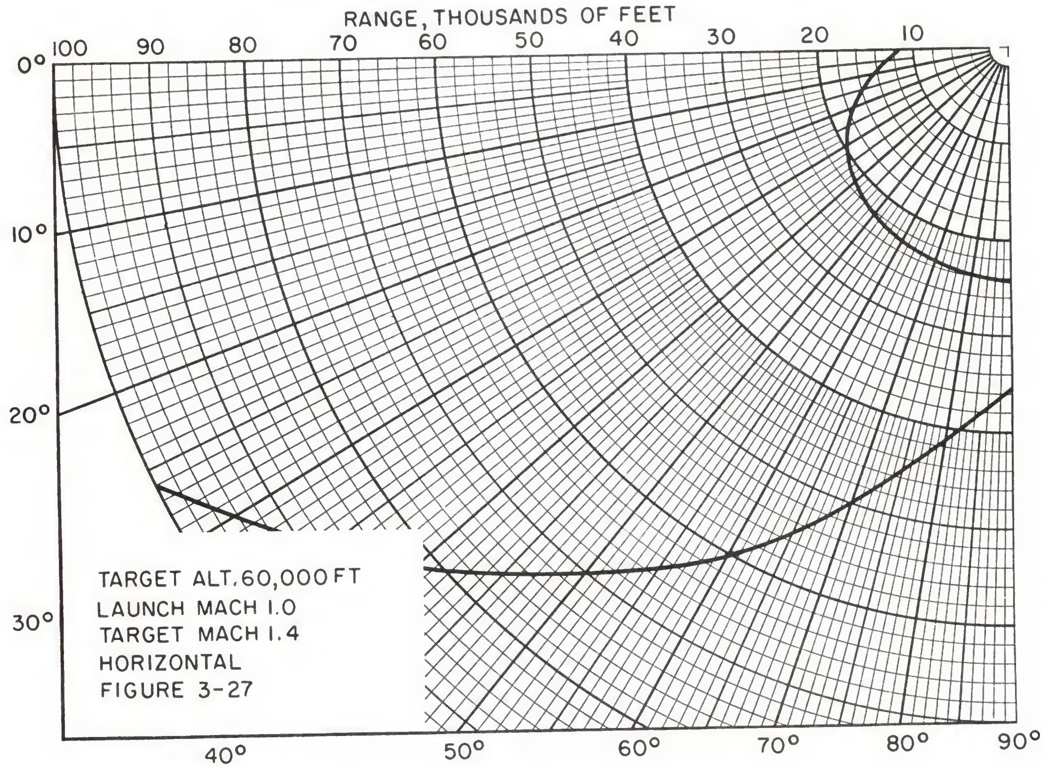


TARGET ALT. 40,000 FT
LAUNCH MACH 1.0
TARGET MACH 2.0
HORIZONTAL
FIGURE 3-25

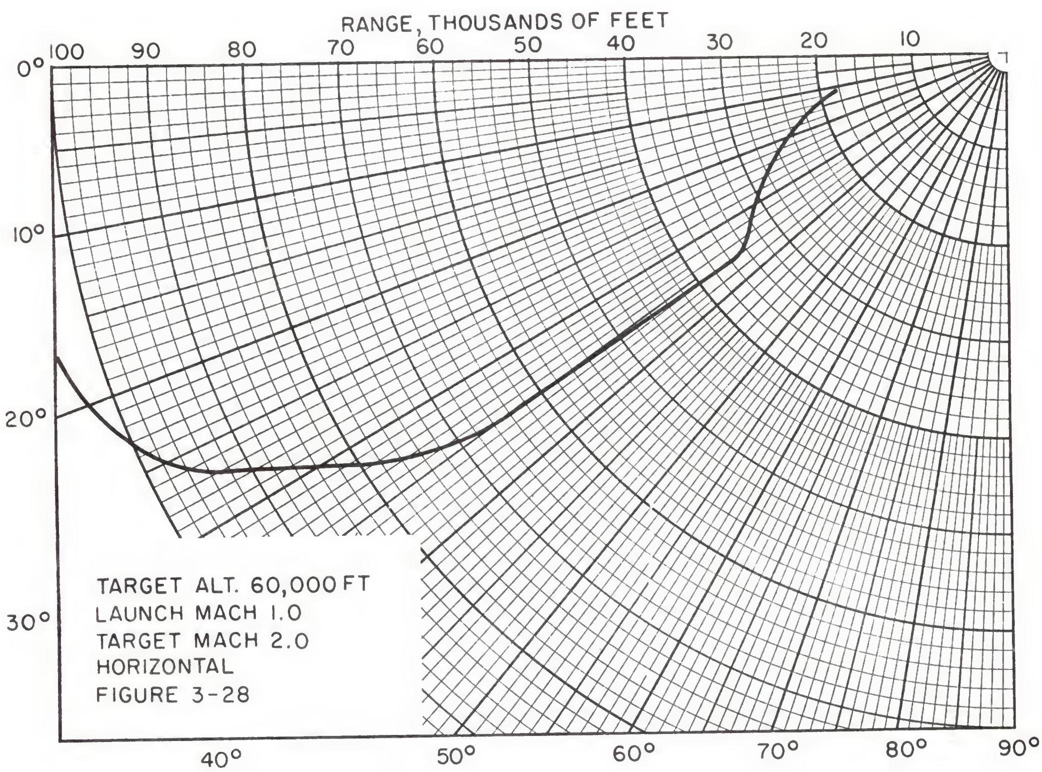


TARGET ALT. 60,000 FT
LAUNCH MACH 0.8
TARGET MACH 0.8
HORIZONTAL
FIGURE 3-26

AIM-9C Envelopes, Head-On



TARGET ALT. 60,000 FT
LAUNCH MACH 1.0
TARGET MACH 1.4
HORIZONTAL
FIGURE 3-27



TARGET ALT. 60,000 FT
LAUNCH MACH 1.0
TARGET MACH 2.0
HORIZONTAL
FIGURE 3-28

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